



Chapter 5: East of the Rockies Region - Affected Environment



CONTENTS

5	East of the Rockies Region.....	5.1-1
5.1	Introduction.....	5.1-1
5.2	Air Quality.....	5.2-1
5.2.1	Affected Environment.....	5.2-1
5.2.1.1	National Ambient Air Quality Standards and Attainment Status.....	5.2-1
5.2.1.2	Class I Areas along the East of the Rockies Region.....	5.2-3
5.3	Biological Resources.....	5.3-1
5.3.1	Introduction.....	5.3-1
5.3.2	Affected Environment.....	5.3-3
5.3.2.1	Blocks of Regionally Significant Habitat.....	5.3-3
5.3.2.2	Sensitive Habitats.....	5.3-6
5.3.2.3	Threatened and Endangered Species.....	5.3-8
5.3.2.4	Wildlife Typically Found in the Region.....	5.3-10
5.3.2.5	Vegetative Habitat Typically Found in the Region.....	5.3-11
5.3.2.6	Wetlands and Waterways.....	5.3-13
5.3.2.7	Aquatic Resources in the Region.....	5.3-14
5.4	Geology and Soils.....	5.4-1
5.4.1	Introduction.....	5.4-1
5.4.2	Affected Environment.....	5.4-1
5.4.2.1	Physiographic Provinces.....	5.4-1
5.4.2.2	Geologic Conditions.....	5.4-5
5.4.2.3	Soils.....	5.4-12
5.4.2.4	Prime and Unique Farmland.....	5.4-12
5.5	Water Resources.....	5.5-1
5.5.1	Introduction.....	5.5-1
5.5.2	Affected Environment.....	5.5-1
5.5.2.1	Groundwater.....	5.5-1
5.5.2.2	Surface Waters and Waters of the United States.....	5.5-3
5.5.2.3	Floodplains.....	5.5-5
5.5.2.4	Transboundary Water Agreements.....	5.5-6
5.6	Noise.....	5.6-1
5.6.1	Introduction.....	5.6-1
5.6.2	Affected Environment.....	5.6-1

5.6.2.1	Regulatory Review	5.6-2
5.6.2.2	CBP Noise Sources.....	5.6-2
5.6.2.3	Non-CBP Noise Sources	5.6-3
5.6.2.4	Background Noise Levels.....	5.6-4
5.6.2.5	National Parks.....	5.6-5
5.7	Climate Change and Sustainability	5.7-1
5.7.1	Introduction.....	5.7-1
5.7.2	Affected Environment.....	5.7-1
5.7.2.1	Climate Regions of the Northern Border—Overview	5.7-1
5.7.2.2	Climate in the East of the Rockies Region	5.7-1
5.7.2.3	Climate Change in the United States—Northern Great Plains Regional Assessment.....	5.7-2
5.8	Land Use	5.8-1
5.8.1	Introduction.....	5.8-1
5.8.2	Affected Environment.....	5.8-1
5.8.2.1	Land Cover and Related Land Uses in the EOR Region.....	5.8-1
5.8.2.2	Land Cover and Related Land Uses in the Areas North of the EOR Region.....	5.8-5
5.8.2.3	Land Ownership in the EOR Region in the United States	5.8-11
5.8.2.4	Land Ownership in Canada North of the EOR Region	5.8-13
5.8.2.5	Land Use Management	5.8-15
5.8.2.6	Consistency with Enforceable Policies of the Coastal Zone Management Act ..	5.8-15
5.9	Aesthetic and Visual Resources	5.9-1
5.9.1	Introduction.....	5.9-1
5.9.2	Affected Environment.....	5.9-1
5.9.2.1	Affected Landscapes.....	5.9-1
5.9.2.2	Areas with High Visual Sensitivity.....	5.9-3
5.9.2.3	Affected User Groups	5.9-4
5.10	Socioeconomic Resources	5.10-1
5.10.1	Introduction.....	5.10-1
5.10.2	Affected Environment.....	5.10-1
5.10.2.1	Regional Demographics	5.10-1
5.10.2.2	Population and Growth Trends.....	5.10-2
5.10.2.3	Income, Poverty, and Unemployment	5.10-7

5.10.2.4	Property Values	5.10-10
5.10.2.5	Regional Economies	5.10-12
5.10.2.6	Economic Profiles of POEs and BPSs in the EOR Region	5.10-15
5.11	Cultural and Paleontological Resources	5.11-1
5.11.1	Introduction	5.11-1
5.11.2	Affected Environment	5.11-1
5.11.2.1	Archaeological Resources: Prehistoric/Precontact Context	5.11-1
5.11.2.2	Prehistoric Archaeological Site Probability	5.11-2
5.11.2.3	Historic Context	5.11-3
5.11.2.4	Historic/Protohistoric Archaeological Site Probability	5.11-4
5.11.2.5	Above-Ground Historic Properties	5.11-5
5.11.2.6	Native American Cultural Resources	5.11-12
5.11.2.7	Paleontological Resources	5.11-16
5.12	Environmental Justice and Protection of Children	5.12-1
5.12.1	Introduction	5.12-1
5.12.1	Affected Environment	5.12-1
5.12.1.1	Minority Populations	5.12-1
5.12.1.2	Low-Income Populations	5.12-3
5.12.1.3	Population of Children under 18 Years of Age	5.12-5
5.13	Human Health and Safety	5.13-1
5.13.1	Introduction	5.13-1
5.13.2	Affected Environment	5.13-1
5.14	Hazardous Materials	5.14-1
5.14.1	Introduction	5.14-1
5.14.1.1	Hazardous Substances	5.14-1
5.14.1.2	Hazardous Waste	5.14-1
5.14.1.3	Special Hazards and Otherwise Regulated Materials	5.14-2
5.14.2	Affected Environment	5.14-2
5.14.2.1	Hazardous Substances, Hazardous Wastes, Special Hazards, and Otherwise Regulated Materials	5.14-2
5.15	Utilities and Infrastructure	5.15-1
5.15.1	Introduction	5.15-1
5.15.2	Affected Environment	5.15-1
5.15.2.1	Water Supply	5.15-1
5.15.2.2	Electrical and Communications Utilities	5.15-1

5.15.2.3	Fuel Supply.....	5.15-2
5.15.2.4	Wastewater Management	5.15-2
5.16	Roadways and Traffic.....	5.16-1
5.16.1	Introduction.....	5.16-1
5.16.2	Affected Environment.....	5.16-1
5.16.2.1	Existing Roadway Network and Roadway Effectiveness	5.16-1
5.16.2.2	Level of Service.....	5.16-2
5.16.2.3	Variability.....	5.16-2
5.16.2.4	Urban and Suburban Transportation Networks	5.16-3
5.16.2.5	Rural and Remote Transportation Networks	5.16-4
5.16.2.6	Federal and State Transportation Regulations.....	5.16-4
5.16.2.7	CBP's Activities Affecting Roadways and Traffic	5.16-4
5.17	Recreation.....	5.17-7
5.17.1	Introduction.....	5.17-7
5.17.2	Affected Environment.....	5.17-9
5.17.2.1	Montana.....	5.17-9
5.17.2.2	North Dakota	5.17-10
5.17.2.3	Minnesota	5.17-10

FIGURES

Figure 5.1-1. The East of the Rockies Region and U.S. Customs and Border Protection Facilities.....	5.1-1
Figure 5.2-1. Nonattainment Areas in the East of the Rockies Region.....	5.2-2
Figure 5.2-2. Maintenance Areas in the East of the Rockies Region.....	5.2-3
5.2-3. Class I Areas in the the East of the Rockies Region.....	5.2-4
Figure 5.3-1. Ecoregions of the East of the Rockies Region.....	5-2
Figure 5.3-2. Blocks of Regionally Significant Habitat in the East of the Rockies Region.....	5.3-5
Figure 5.4-1. Physiographic Provinces, Divisions, and Sections of the East of the Rockies Region.....	5.4-2
Figure 5.4-2. Geologic Conditions of the East of the Rockies Region.....	5.4-6
Figure 5.4-3. Extent of the Laurentide Ice Sheet.....	5.4-7
Figure 5.4-4. Seismicity in the East of the Rockies Region.....	5.4-8
Figure 5.4-5. Landslide.....	5.4-9
Figure 5.4-6. Landslide Incidence in the East of the Rockies Region.....	5.4-10
Figure 5.4-7. Karst Topography in the East of the Rockies Region.....	5.4-11
Figure 5.4-8. Soil Orders in the East of the Rockies Region.....	5.4-13
Figure 5.4-9. Prime Farmland in the East of the Rockies Region.....	5.4-14
Figure 5.5-1. East of the Rockies Groundwater Aquifers.....	5.5-3
Figure 5.5-2. River Basins in the East of the Rockies Region.....	5.5-4
Figure 5.5-3. Rainy River Basin in Minnesota.....	5.5-5
Figure 5.6-1. Background Noise Levels in the East of the Rockies Region.....	5.6-4
Figure 5.8-1. Land Cover in the East of the Rockies Region.....	5.8-9
Figure 5.8-2. Land Use in the East of the Rockies Region.....	5.8-10
Figure 5.8-3. Land Ownership in the East of the Rockies Region.....	5.8-13
Figure 5.10-1. Percent Change in the East of the Rockies Region Population, 2000–2009..	5.10-3

Figure 5.10-2. Percent Change in Canadian Population North of the East of the Rockies Region, 1996–2006	5.10-6
Figure 5.10-3. Locations of Points of Entry and Border Patrol Stations in the East of the Rockies Region	5.10-18
Figure 5.11-1. Native American Lands Within the 100-mile PEIS Corridor Crossing Minnesota, North Dakota, and the Eastern Two-Thirds of Montana*	5.11-14
Figure 5.11-2. Nineteenth-Century Cessions, Reservations, and Portages (1907)	5.11-15
Figure 5.11-3. Judicially Established Indian Land Areas as of 1978	5.11-15
Figure 5.11-4. Early Tribal, Cultural, and Linguistic Areas	5.11-16
Figure 5.13-1. U.S., Interstate, State, and County Roads in the East of the Rockies Region	5.13-3
Figure 5.13-2. Navigable Water in the East of the Rockies Region	5.13-5
Figure 5.13-3. CBP Officers Train at Firing Range	5.13-8
Figure 5.17-1. Federally protected recreation areas, including Protected Recreation Areas, Including National Forests, Parks, Recreation Areas, and Wildlife Refuges in the East of the Rockies Region	5.17-8

TABLES

Table 5.1-1. Public Lands in the East of the Rockies Region.....	5.1-2
Table 5.4-1. Physiographic Provinces in the East of the Rockies Region.....	5.4-2
Table 5.5-1. Water Use in the East of the Rockies Region in 2005	5.5-1
Table 5.6-1. Common Sound Levels	5.6-1
Table 5.6-2. CBP Noise Sources.....	5.6-3
Table 5.6-3. Description of Background Noise Levels.....	5.6-5
Table 5.6-4. National Parks in the East of the Rockies Region	5.6-5
Table 5.8-1. Land Cover for the East of the Rockies Region	5.8-2
Table 5.8-2. Recreational Land Use in the East of the Rockies Region	5.8-4
Table 5.8-3. Conservation Land Use in the East of the Rockies Region.....	5.8-4
Table 5.8-4. Land Cover in Canada North of the East of the Rockies Region.....	5.8-6
Table 5.8-5. Recreational Land Use in Canada North of the East of the Rockies Region	5.8-7
Table 5.8-6. Conservation Land Use in Canada North of the East of the Rockies Region.....	5.8-8
Table 5.8-7. Land Ownership in the East of the Rockies Region.....	5.8-12
Table 5.8-8. Land Ownership in Canada North of the East of the Rockies Region	5.8-14
Table 5.8-9. Aboriginal Land in Canada North of the East of the Rockies Region	5.8-15
Table 5.10-1. Population of the East of the Rockies Region*	5.10-2
Table 5.10-2. Population Centers in the East of the Rockies Region*	5.10-4
Table 5.10-3. Population North of the East of the Rockies Region in Canada.....	5.10-5
Table 5.10-4. Population in Census Metropolitan Areas in Study Area North of the East of the Rockies Region in Canada	5.10-7
Table 5.10-5. Income and Poverty Statistics for States in the East of the Rockies Region...	5.10-8
Table 5.10-6. Unemployment Rates for the East of the Rockies Region	5.10-8
Table 5.10-7. Income and Poverty Statistics North of the East of the Rockies Region in Canada.....	5.10-9

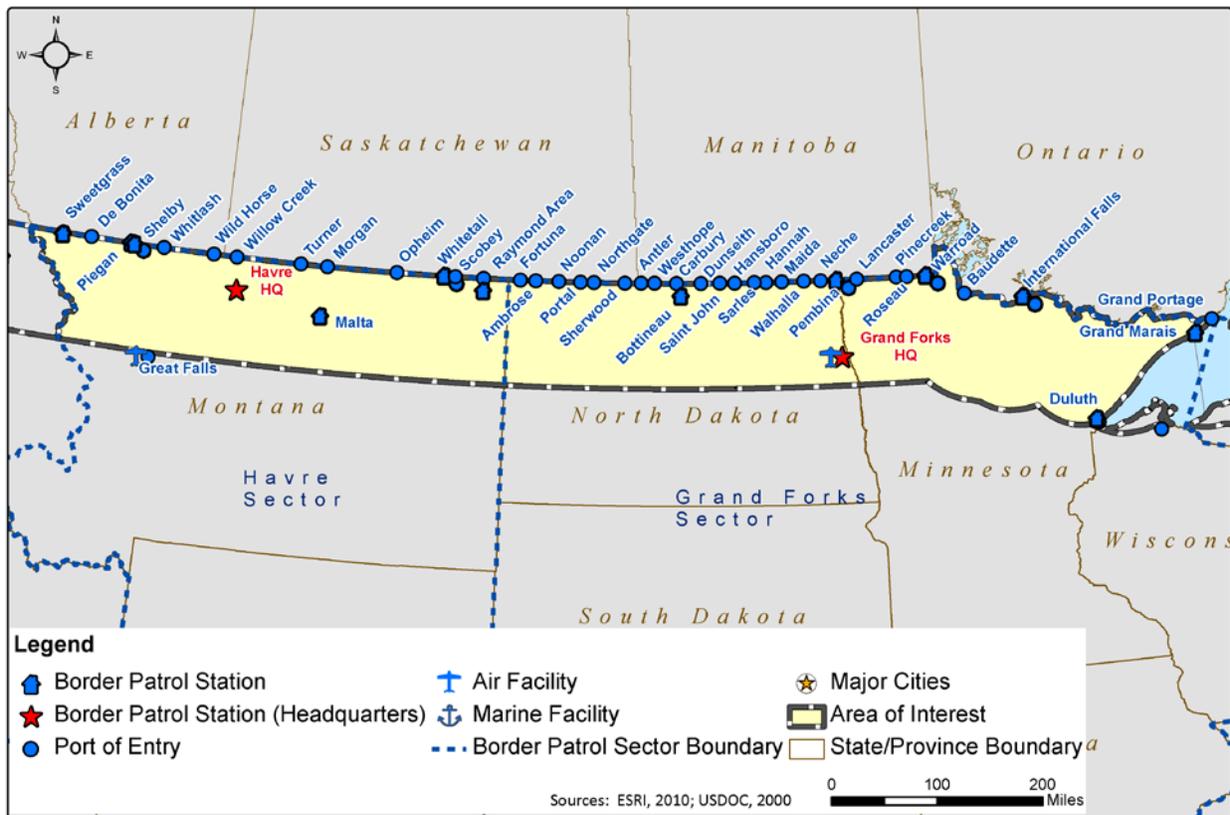
Table 5.10-8. Unemployment Rates North of the East of the Rockies Region in Canada ..	5.10-10
Table 5.10-9. Median Property Value for the East of the Rockies Region	5.10-11
Table 5.10-10. Median Property Value North of the East of the Rockies Region in Canada	5.10-12
Table 5.10-11. Canadian Visitors Entering the East of the Rockies Region by Surface Transportation*	5.10-14
Table 5.10-12. Point of Entry and Border Patrol Station Sites Profiled in the East of the Rockies Region	5.10-16
Table 5.11-1. Cultural Resources in the Vicinity of CBP Facilities in Minnesota	5.11-6
Table 5.11-2. Cultural Resources in the Vicinity of CBP Facilities in North Dakota	5.11-8
Table 5.11-3. Cultural Resources in the Vicinity of CBP Facilities in Montana	5.11-10
Table 5.11-4. Historic Buildings on CBP Property in Montana	5.11-12
Table 5.11-5. Native American Tribes that Have a Reservation, Judicially Established Interest, or Established Traditional Ties to Land within the 100-mile PEIS Corridor	5.11-13
Table 5.12-1. Minority Statistics for the East of the Rockies Region (Percent of Population)	5.12-2
Table 5.12-2. Visible Minority Statistics North of the East of the Rockies Region in Canada* (Percent of Population)	5.12-3
Table 5.12-3. Income and Poverty Statistics for the East of the Rockies Region	5.12-4
Table 5.12-4. Income and Poverty Statistics North of the East of the Rockies Region in Canada	5.12-5
Table 5.12- 5. Age Distribution in the East of the Rockies Region (Percent of Population)	5.12-6
Table 5.12-6. Age Distribution North of the East of the Rockies Region in Canada (Percent of Population)	5.12-7
Table 5.16-1. Percent Distribution of Traffic by Vehicle Class, Total U.S.	5.16-1
Table 5.16-2. Busiest POEs for Passenger Vehicles in the East of the Rockies Region	5.16-5

5 EAST OF THE ROCKIES REGION

5.1 INTRODUCTION

This chapter analyzes potential environmental effects in the East of the Rockies Region arising from U.S. Customs and Border Protection (CBP) actions related to its homeland-security mission. The East of the Rockies Region includes the areas of Minnesota, North Dakota, and Montana east of the Continental Divide that fall within about 100 miles of the Northern Border. Figure 5.1-1 displays the territory and CBP facilities of the region.

Figure 5.1-1. The East of the Rockies Region and U.S. Customs and Border Protection Facilities



The Northern Border environment in the East of the Rockies Region has a wide variety of habitats and terrain types that include heavily forested lands, semi-arid plains, rolling hills, and deep river valleys and associated watersheds (including the Milk River, Marais River, Missouri River, Souris River, Red River, Lake of the Woods, Rainy River, Rainy Lake, and Lake Superior). The region is dominated by open scrub-shrub, grass, and open prairie lands that account for approximately 67 percent of all land cover types in this region. Forested land, found mostly in Minnesota and the Montana Rockies, accounts for another 20 percent of the land cover area.

Much of the border land in North Dakota is privately owned farmland in flat terrain. Border land in Minnesota also has much privately owned farmland in flat terrain, with forested lands in the eastern portion of the state. In Montana the border lands are primarily privately owned farm and

ranch lands in terrain that is mostly flat to moderately sloping but mountainous near the Continental Divide where Glacier National Park is located. Public lands in the East of the Rockies Region are shown in Table 5.1-1.

Table 5.1-1. Public Lands in the East of the Rockies Region

<p>INDIAN RESERVATIONS</p> <ul style="list-style-type: none"> • Blackfeet, MT • Rocky Boy’s, MT • Ft. Belknap, MT • Ft. Peck, MT • Ft. Berthold, ND • Turtle Mountain, ND • Spirit Lake, ND • Red Lake, MN • Nett Lake, MN 	<p>NATIONAL WILDLIFE REFUGES</p> <ul style="list-style-type: none"> • UL Bend, MT • Bowdoin, MT • Medicine Lake, MT • Upper Souris, ND • J. Clark Salyer, ND • Lostwood, ND 	<p>STATE FORESTS</p> <ul style="list-style-type: none"> • Pat Bayle, MN • Grand Portage, MN • Land of Lakes, MN • Savanna, MN • Hill River, MN • Big Fork, MN • Blackduck, MN • Pine Island, MN • George Washington, MN • Bear Island, MN • Lake Jeanette, MN • Buena Vista, MN • Koochiching, MN • Kabetogama, MN • Turtle Mountain, ND • Lost River, MN • Smoky Bear, MN
<p>NATIONAL GRASSLANDS</p> <ul style="list-style-type: none"> • Little Missouri, ND 	<p>NATIONAL FOREST</p> <ul style="list-style-type: none"> • Superior, MN • Chippewa, MN • Lewis & Clark, MT • Flathead, MT 	
<p>FEDERAL WILDLIFE MANAGEMENT AREAS</p> <ul style="list-style-type: none"> • Lewis & Clark, ND 		
<p>NATIONAL PARKS</p> <ul style="list-style-type: none"> • Voyageurs, MN • Glacier, MT 	<p>STATE WILDLIFE MANAGEMENT AREAS</p> <ul style="list-style-type: none"> • Red Lake, MN • Roseau River, MN • Beaches, MN • Thief Lake, MN 	<p>WILDERNESS AREA</p> <ul style="list-style-type: none"> • Boundary Waters Canoe, MN

U.S. Border Patrol in the East of the Rockies Region

There are two U.S. Border Patrol (USBP) sectors within the East of the Rockies Region. The Havre sector has 456 miles of international border, starting along the Montana-North Dakota border to the east and ending at the Continental Divide to the west. The sector consists of seven stations in Montana (Plentywood, Scobey, Havre, Malta, St. Mary, Shelby, and Sweetgrass) and two substations, also in Montana (Billings and Twin Falls). Billings and Twin Falls are deep interior stations, while the other stations are within a 45-minute drive of the Northern Border.

The Grand Forks sector has 861 miles of international border starting at Lake Superior on the east and ending at the Montana-North Dakota border on the west. The sector consists of eight

stations (Grand Forks, North Dakota; Bottineau, North Dakota; Duluth, Minnesota; Grand Marais, Minnesota; International Falls, Minnesota; Pembina, North Dakota; Portal, North Dakota; and Warroad, Minnesota).

The large swaths of remote terrain pose a challenge for surveillance. CBP uses diverse patrols, including on- and off-road-vehicle, snowmobile, pedestrian, and aerial patrols. Because this region is remote, CBP makes use of partnerships with governmental agencies (Federal law enforcement and land management agencies, state departments of natural resources, and Canadian authorities) and private entities (communities, landowners, and interboundary groups) for both law enforcement and intelligence missions.

The national forest areas and wilderness areas listed in Table 5.1-1 pose specific access challenges. Both CBP and the U.S. Forest Service (USFS) are working to fully implement a memorandum of understanding (MOU) signed in 2006 between the Department of Homeland Security (DHS), the Department of Agriculture (USDA), and the Department of the Interior (DOI). The MOU sets out a framework for cooperation and provides for DHS access to USFS lands to implement its security mission.

Border Patrol sectors within the region deploy a combination of static permanent surveillance, ground radar, and acoustic sensors, with repeaters for extended line-of-sight coverage. Forward operating bases (FOBs) are deployed in parts of this region.

Office of Air and Marine in the East of the Rockies Region

The Montana Great Falls Air Branch of the CBP Office of Air and Marine (OAM) deploys aircraft from Great Falls Airport in Montana. Several dozen pilots conduct airplane and helicopter patrols of land and air space areas. The North Dakota Grand Forks Air Branch of OAM operates from Grand Forks Air Force Base in Grand Forks, North Dakota. In addition to standard surveillance aircraft, the North Dakota Grand Forks Air Branch also operates the only unmanned aerial systems (UAS) on the Northern Border. The allowable service range of UAS in this region was recently extended to the Northern Border between Land of Lakes, Minnesota and Spokane, Washington.

Office of Field Operations in the East of the Rockies Region

CBP Office of Field Operations (OFO) port-of-entry personnel are the face at the border for most visitors entering the United States. Each OFO region includes one or more large ports of entry (POEs) that may oversee smaller ports of varying sizes. CBP enforces the import and export laws and regulations of the U.S. Federal government and implements immigration policy and programs. Agriculture is also inspected at POEs to protect the United States from carriers of animal and plant pests and diseases that could cause serious damage to U.S. crops, livestock, pets, and environment.

Montana POEs under the management of OFO include the larger service port at Great Falls. A service port is an OFO location that has a full range of cargo processing functions, including inspections, entry, collections, and verification. There are also larger area ports with responsibilities for more than one port at Sweetwater and Raymond. Other East of the Rockies ports in the state include Butte Airport, Del Bonita, Kalispell Airport, Morgan, Ophem, Scobey, Turner, Whitetail, Whitlash, Wild Horse, and Willow Creek.

North Dakota POEs under the management of OFO include the larger service port at Pembina. Other East of the Rockies ports in the state include Ambrose, Antler, Carbury, Dunseith, Fortuna, Grand Forks, Hannah, Hansboro, Fargo, Maida, Minot International Airport, Neche, Noonan, Northgate, Portal, Sarles, Sherwood, Saint John, Walhalla, Westhope, and Williston-Sloulin Field International Airport.

Minnesota POEs under the management of OFO include the larger service port at Minneapolis. Other East of the Rockies ports in the state include Baudette, Duluth, Grand Portage, International Falls, Lancaster, Pinecreek, Rochester, Roseau, and Warroad.

5.2 AIR QUALITY

The East of the Rockies Region study area contains many air quality control regions (AQCR) and Class I areas that could experience impacts due to the proposed action and alternatives in this Programmatic Environmental Impact Statement (PEIS). (Class I areas are Federal lands, designated by Congress as of August 7, 1977, that have air quality restrictions under Section 162(a) of the Clean Air Act (CAA) that are more stringent than the standards that apply elsewhere.) However, the mere presence of a sensitive area, such as a nonattainment, maintenance, or Class I areas, does not guarantee that that area would be impacted by U.S. Customs and Border Protection (CBP) activities. Chapter 3, Section 3.2 provides more detailed information on national standards and requirements used to describe and determine effects to air quality resources.

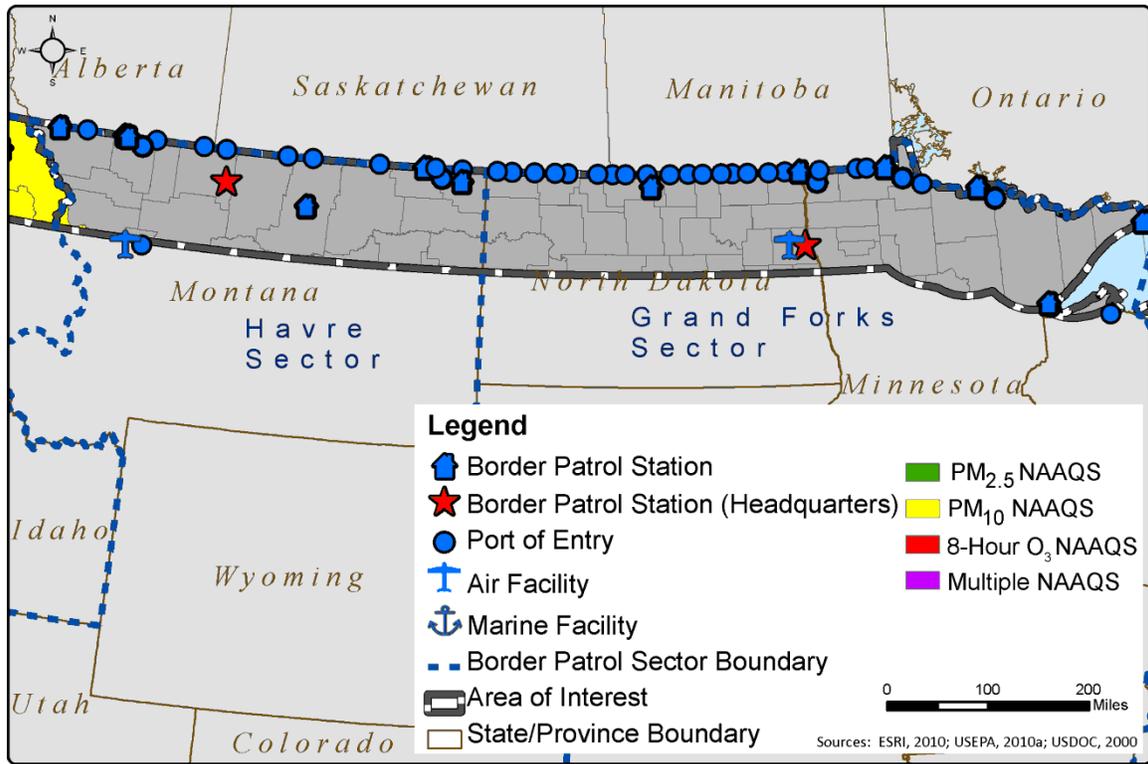
5.2.1 AFFECTED ENVIRONMENT

5.2.1.1 National Ambient Air Quality Standards and Attainment Status

Nonattainment areas within 100 miles of the border are shown in Figure 5.2-1. The narrow valleys and regional climate often cause temperature inversions that trap pollutants in cold air along valley floors. Inversions become even more problematic in urban areas where vehicle exhaust, smoke from wood stoves, and industrial processes are more concentrated (MDEQ, 2010; IDEQ, 2010). Major cities usually have high traffic volumes and large industrialized areas that can contribute to elevated O₃ and PM_{2.5} (particulate matter that is 2.5 micrometers in diameter and smaller). There is a small section of land in Montana in nonattainment for PM₁₀ (particulate matter that is 10 micrometers in diameter and smaller). The entire East of the Rockies Region has some of the best air quality in the United States, with much of this region being remote.

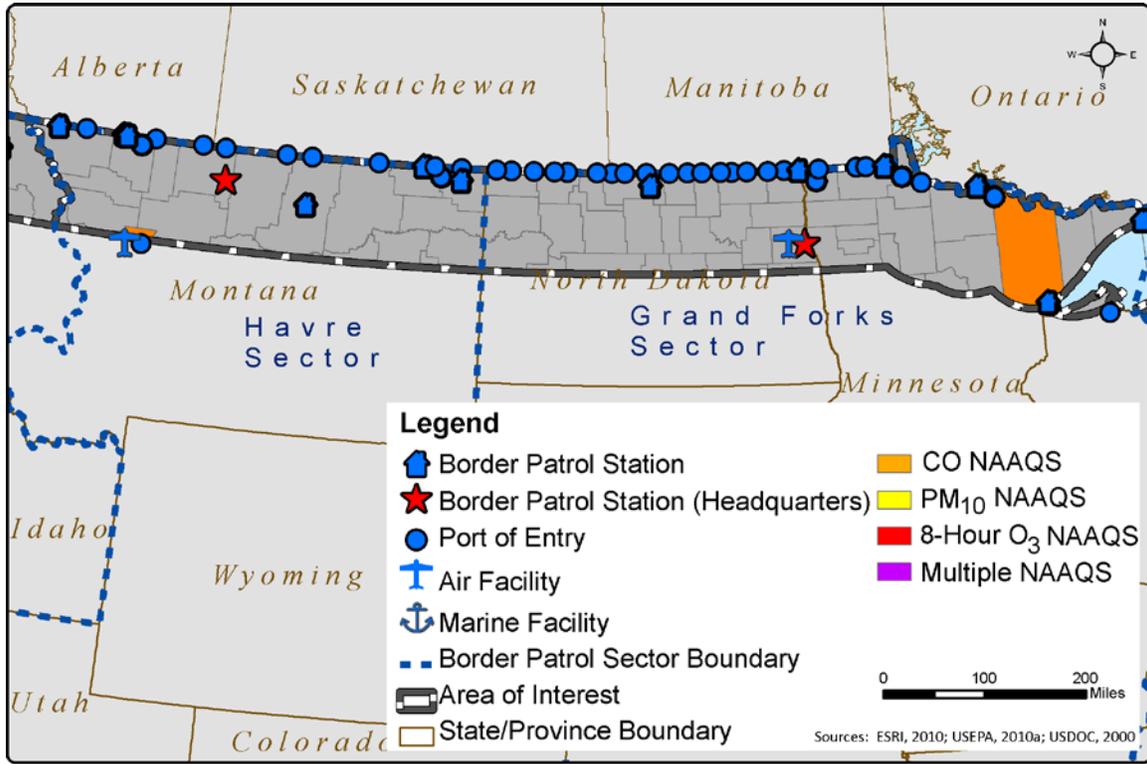
Federal regulations designate AQCRs that were once classified as nonattainment but that have lowered levels of pollutants through the use of regional controls, as maintenance areas. Consistent with the nonattainment areas, Figure 5.2-2 shows one maintenance area in the East of the Rockies Region in Saint Louis County Minnesota for carbon monoxide (CO). A complete list of nonattainment and maintenance areas organized by state and county is located in Appendix J.

Figure 5.2-1. Nonattainment Areas in the East of the Rockies Region



NAAQS: National Ambient Air Quality Standards

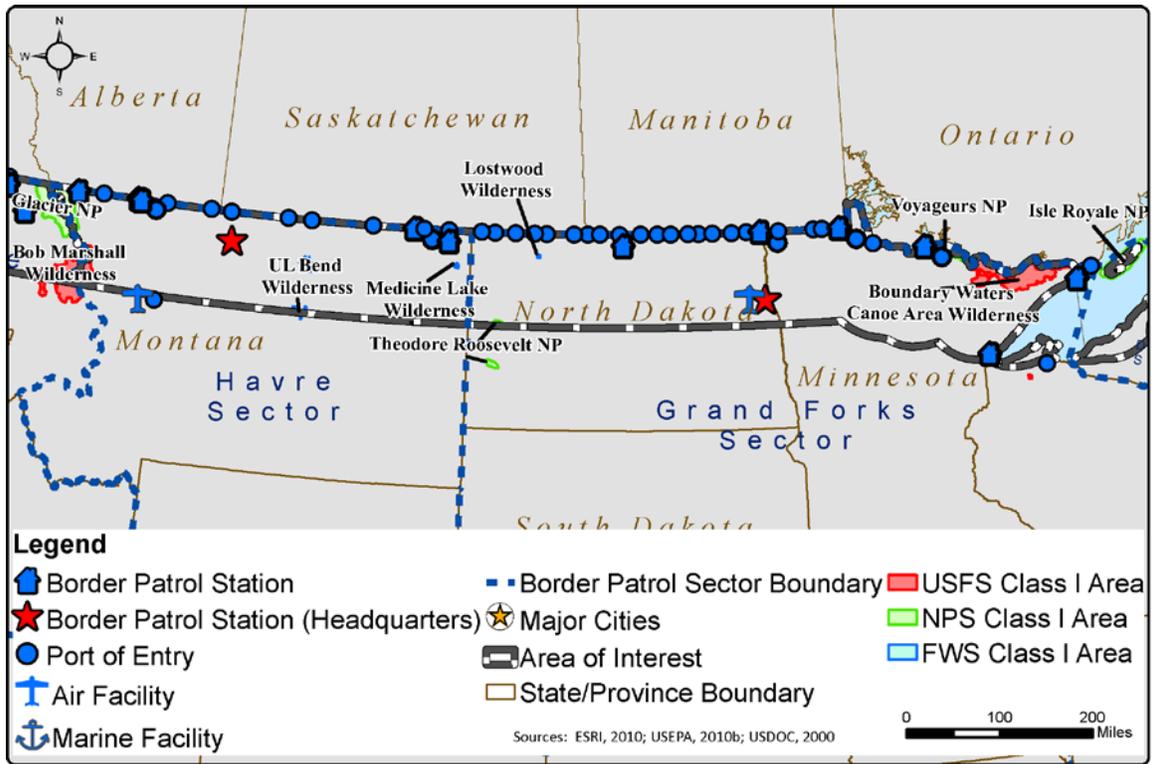
Figure 5.2-2. Maintenance Areas in the East of the Rockies Region



5.2.1.2 Class I Areas along the East of the Rockies Region.

The CAA protects areas where air quality exceeds national standards established by the Environmental Protection Agency (EPA) by measures to prevent significant deterioration of air quality (PSD). The more stringent restrictions in effect in Class I areas are largely meant to maintain unimpaired visibility in areas such as “national parks, national wilderness areas, national monuments, national seashores, and other areas of special natural, recreational, scenic, or historic value.” In general, "clean air areas" are protected through ceilings on the additional amounts of certain air pollutants over a baseline level. The PSD increment amounts vary based on the area’s classification. Class I areas and major CBP facilities in the East of the Rockies Region are shown on the map in Figure 5.2-3.

5.2-3. Class I Areas in the the East of the Rockies Region



USFS: United States Forest Service

NPS: National Park Service

FWS: U.S. Fish and Wildlife Service

5.3 BIOLOGICAL RESOURCES

5.3.1 INTRODUCTION

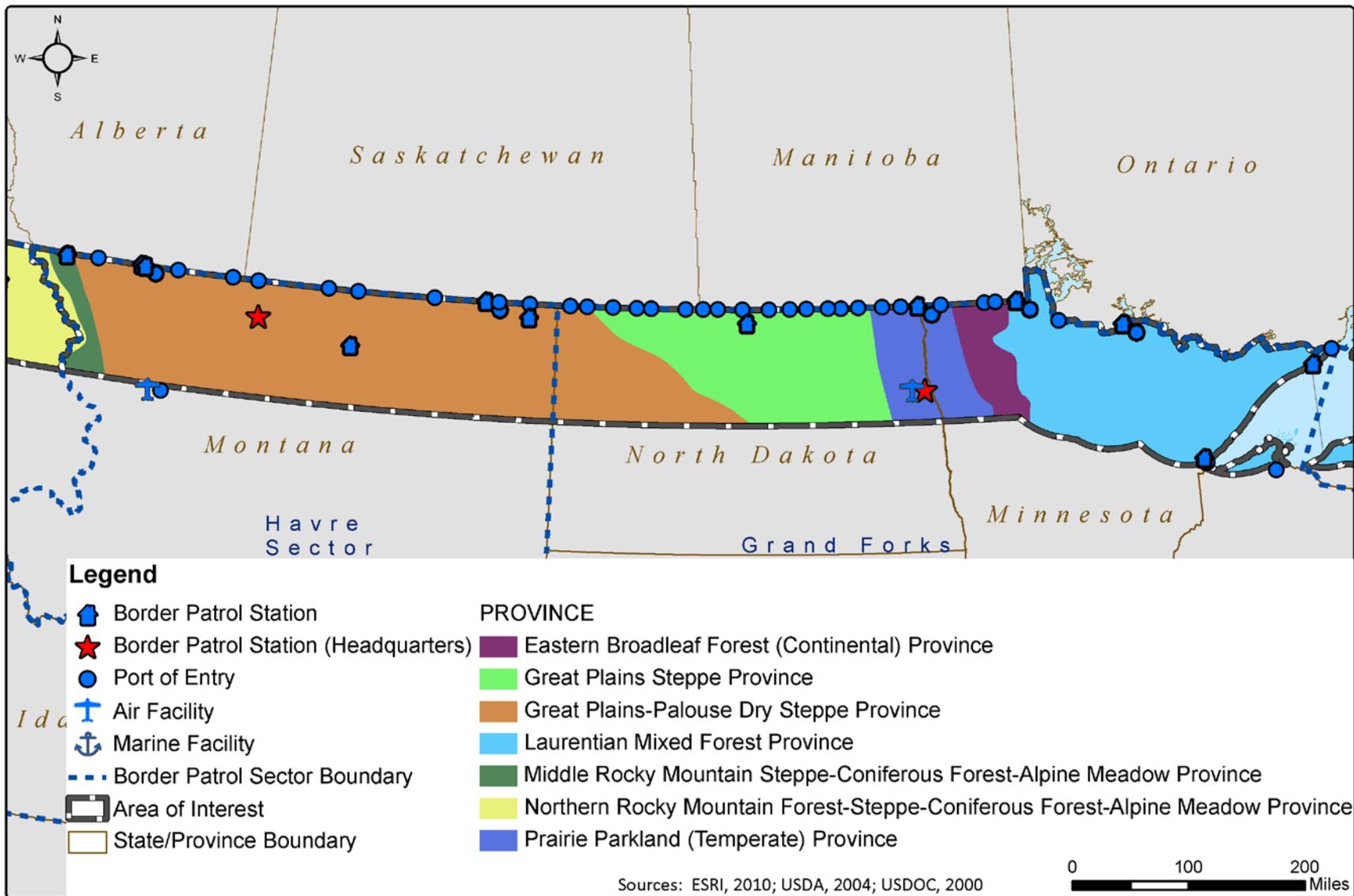
The East of the Rockies Region (EOR Region) falls within portions of the following states: Montana, North Dakota, and Minnesota. Biologically, the EOR Region can be divided into six major ecoregions:

- Middle Rocky Mountain Steppe–Coniferous Forest–Alpine Meadow;
- Great Plains–Palouse Dry Steppe;
- Great Plains Steppe;
- Prairie Parkland;
- Eastern Broadleaf Forest (continental); and
- Laurentian Mixed Forest.

Generally, these ecoregions continue north of the U.S.-Canada border (Figure 5.3-1). For a complete description of the above ecoregions, refer to Appendix L.

Map resources for the ecoregion map in this section were developed from the U.S. Census Bureau, USGS, and Environmental Systems Research Institute (ESRI) databases. Each ecoregion has a unique set of biological, climatic, and topographical characteristics along with unique challenges and opportunities for U.S. Customs and Border Protection.

Figure 5.3-1. Ecoregions of the East of the Rockies Region



5.3.2 AFFECTED ENVIRONMENT

5.3.2.1 Blocks of Regionally Significant Habitat

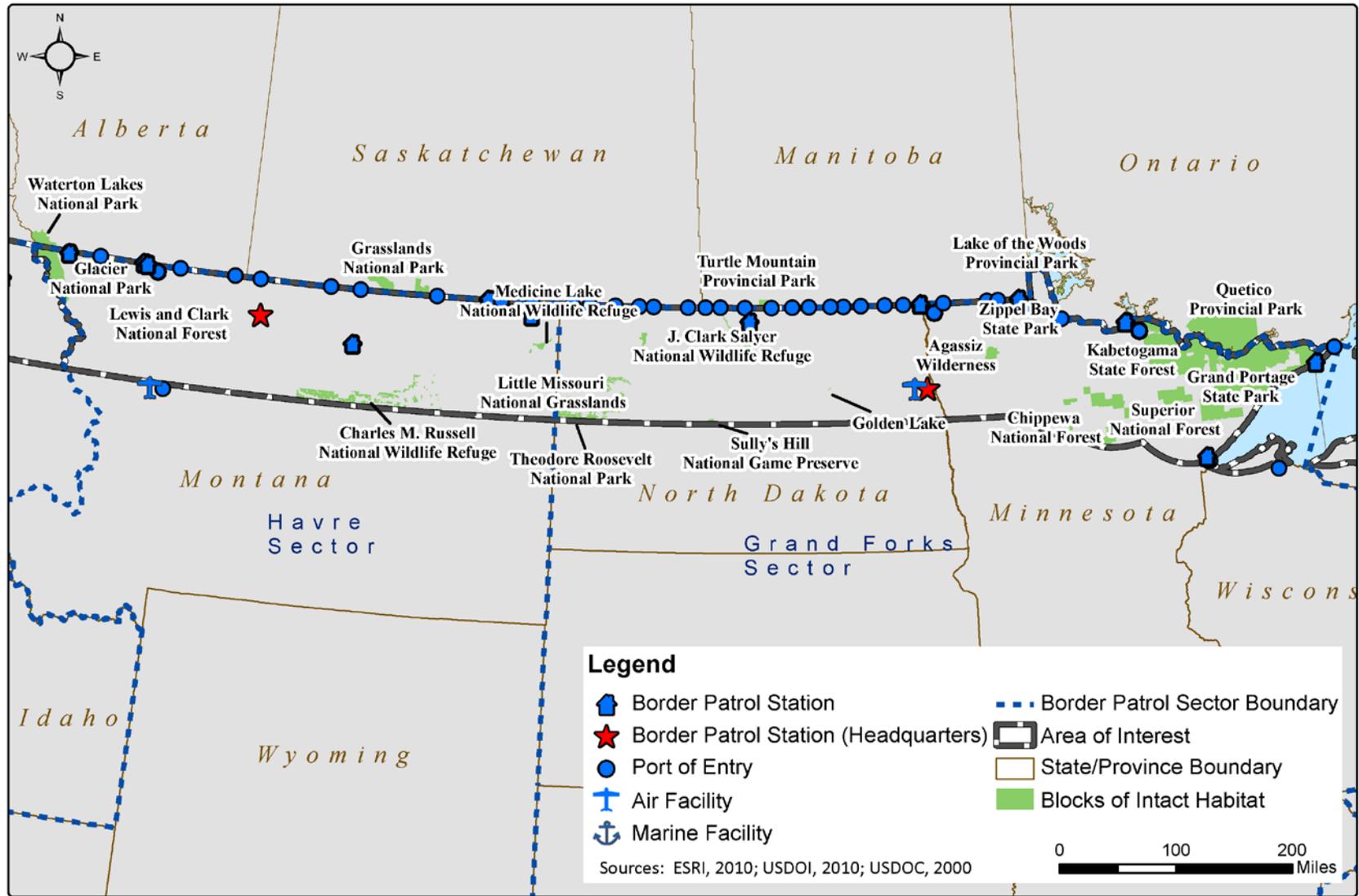
The blocks of regionally significant habitat listed below and shown in Figure 5.3-2 are relatively undeveloped and intact habitat protected as wilderness, state parks, and state and national forests. “Intact habitat” refers to areas of largely unfragmented habitat with few alterations or disturbances, such as improved roads or other development. Most areas listed are protected by law (wilderness areas, national parks), while others may occupy private lands and often cross state and country boundaries.

Selected regionally significant blocks that represent this region include:

- Agassiz Beach Ridges (Minnesota)
- Agassiz Wilderness (Minnesota)
- Akamina-Kishinena Provincial Park (British Columbia, Canada)
- Audubon National Wildlife Refuge (North Dakota)
- Bluestem Prairie Scientific and Natural Area (Minnesota)
- Boundary Waters Canoe Area Wilderness (Minnesota)
- Bowdoin National Wildlife Refuge (Montana)
- Charles M. Russell National Wildlife Refuge (Montana)
- Chase Lake Wilderness (North Dakota)
- Chippewa National Forest (Minnesota)
- Comertown Pothole Prairie Preserve (Montana)
- Forest River Biology Area (North Dakota)
- Garden Island State Recreation Area (Minnesota)
- Glacier National Park (eastern portion)(Montana, USA)/Waterton Lakes National Park and Akamina-Kishinena Provincial Park (Alberta and British Columbia, Canada)
- Golden Lake SWMA (North Dakota)
- Grand Portage National Monument (Minnesota)
- Grand Portage State Park (Minnesota)
- Grasslands National Park of Canada (Alberta, Canada)
- Gunlogson Arboretum Nature Preserve (North Dakota)
- H.R. Morgan State Nature Preserve (North Dakota)
- J. Clark Salyer National Wildlife Refuge (North Dakota)
- Kabetogama State Forest (North Dakota, USA)/ Sandpoint Island Provincial Park and Quetico Provincial Park (Ontario, Canada)
- Kennedy Coulee (Alberta, Canada)

- La Verendrye Provincial Park (Ontario, Canada)
- Lake of the Woods Provincial Park (Ontario, Canada)
- Lewis and Clark National Forest lands (portions) (Montana)
- Little Missouri National Grassland (North Dakota)
- Lostwood National Wildlife Refuge (North Dakota)
- Lostwood Wilderness (North Dakota)
- Lower Yellowstone River (Montana)
- Malmberg Prairie (Minnesota)
- Medicine Lake National Wildlife Refuge (Montana)
- Medicine Lake Wilderness (Montana)
- Milk River Natural Area (Alberta, Canada)
- Mirror Pool Wildlife Management Area (WMA) (North Dakota)
- Missouri Coteau(North Dakota)
- North Dakota State Forest Lands and Willow Lake National Wildlife Refuge (North Dakota, USA)/Turtle Mountain Provincial Park (Manitoba, Canada)
- Northern Montana prairies (Montana)
- Outpost Wetlands Natural Area and Police Outpost Provincial Park (Alberta, Canada)
- Pembina Gorge (North Dakota)
- Pembina Trail Preserve (Minnesota)
- Pigeon River Provincial Park (Ontario, Canada)
- Pine Butte Swamp Preserve (Montana)
- Sable Islands Provincial Nature Reserve (Ontario, Canada)
- Sully's Hill National Game Preserve (North Dakota)
- Superior National Forest (Minnesota)
- Theodore Roosevelt National Park (within the Little Missouri National Grassland) (North Dakota)
- Theodore Roosevelt Wilderness (North Dakota)
- Turtle Mountain Wetland areas on the Blackfeet Indian Homeland/Reservation (Montana)
- UL Bend Wilderness (Montana)
- Voyageurs National Park (Minnesota)
- Zippel Bay State Park (Minnesota)

Figure 5.3-2. Blocks of Regionally Significant Habitat in the East of the Rockies Region



5.3.2.2 Sensitive Habitats

Within a 100-mile zone adjacent to the U.S.–Canada border in this region are several ecological communities representing sensitive habitats. The sensitive habitats described here occur in many of the larger habitat areas listed in Section 5.3.2.1, and are home to many of the threatened and endangered species in the next section. For example, Eastern Great Plains Tallgrass Aspen Parkland occurs in many grassland areas in this broad geographic region, home to protected species and common plants such as little bluestem (*Schizachyrium scoparium*). Some descriptive habitat names used below, such as cedar/tamarack swamps, span many regional boundaries and are more general in meaning. Others, such as calcareous fens (a wetland plant community), define much more specific ecological associations.

Many of these habitats are very fine in scale and form a patchwork of biologically sensitive and diverse areas. The list of sensitive habitats is based on those enumerated and described by the World Wildlife Fund (2001b), ecological system descriptions within the NatureServe.org database, and each state's respective natural resources agency (NatureServe, 2010).

- Alpine dwarf-shrubland—dwarf-shrubs or dwarf willows forming a heath-type ground cover;
- Alpine meadows—open meadows at and above the timberline;
- Bogs—wetland type that accumulates acidic peat (deposits of dead plant material);
- Calcareous fens—rarest wetland community in Minnesota and Wisconsin, with input of alkaline mineral-rich groundwater;
- Cedar/tamarack swamps—forested wetland characterized by one or both of these tree species;
- Eastern Great Plains Tallgrass Aspen Parkland—mosaic or combination of tallgrass prairie, brush prairie, aspen-oak mixed woodlands, and wet prairie (see photo above);
- Eastern Great Plains wet meadow, prairie, and marsh—distinguished from upland prairie systems by exhibiting seasonal inundation (wetlands with near-surface groundwater), in conjunction with silty, dense clay, often hydric soils;
- Flowages—series of connected lakes;
- Freshwater estuaries—ecological community where lake and river waters mix;
- Great Lakes beaches and shorelines—Great Lakes beach community at interface of land and water, adjacent to margins of Lake Superior, often with sparsely vegetated dunes;
- Great Plains ponderosa pine woodland and savanna—ponderosa pine woodlands surrounded by grasslands;
- Great Plains sand prairie—often considered part of the tallgrass or mixed-grass regions in the Great Plains, with a mixture of elements from the Western Great Plains shortgrass prairie, Central mixed-grass prairie, and northwestern Great Plains mixed-grass prairie, and soils derived from sandstone weathering;
- Hardwood swamps—deciduous forested wetland;

- Inland lake shorelines—beaches of inland lakes characterized by water-level fluctuation that prevents development of stable shoreline plant communities, instead supporting more-specialized biota adapted to sandy or gravelly shorelines;
- Middle Rocky Mountain montane Douglas-fir forest and woodland—mixed deciduous/coniferous montane forest.
- Northwestern Great Plains mixed-grass prairie—grassland of medium-height grasses, on fine-textured and well-drained soils;
- Prairie Potholes—water-holding depressions of glacial origin, primary wetland habitat;

Prairie pothole



Source: (Kevin Kowalchuk, 2010a).

- Rocky Mountain riparian woodland and shrubland—within the flood zone of rivers, on islands, sand and gravel bars, and adjacent streambanks;
- Rocky Mountain subalpine-fen—a mountain wetland fed by mineral-rich surface water or groundwater and below alpine areas in elevation;
- Sedge meadow—wetland dominated by sedges growing on saturated soils typically composed of peat or muck.
- Shorelines-dunes-cliffs/talus—rock outcrops that contain sparsely vegetated native plant communities;
- Tallgrass prairie—extensive area of flat or rolling, predominantly treeless grassland, native to central North America;

Tallgrass prairie



Source: (USDOJ, 2011a).

- The Red River Valley shoreline—area of fertile soils subject to flooding;
- Vernal pool—temporary pools, usually devoid of fish, that allow development of natal amphibian and insect species; and
- Wooded areas—commonly found on moist hillsides.

5.3.2.3 Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 protects federally listed threatened and endangered species. The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend.

Appendix M lists the threatened or endangered species by county in the EOR Region. Species are listed as threatened or endangered at either the Federal and/or state level; some non-threatened or endangered species are categorized as “conservation concern” or “special concern” species.

Some states differ in how they list and protect threatened and endangered species. The following list gives the specific agencies and listing differences (if applicable) in the EOR Region.

- Minnesota has an endangered species act that covers animals and plants (NANFA, 2011). The Minnesota Department of Natural Resources designates rare species as threatened, endangered, or special concern.
- Montana has an endangered species act that covers animals, but not plants (NANFA, 2011). Montana Fish, Wildlife, and Parks lists some species as species of concern, in place of either a threatened or endangered listing. The status represents a separate category, described as, “Potentially at risk because of limited and/or declining numbers, range and/or habitat, even though it may be abundant in some areas” (MT FWP, 2010).
- North Dakota does not have an endangered species act (NANFA, 2011); however, the North Dakota Game and Fish Department has identified 100 non-game species as species of conservation priority under North Dakota's Comprehensive Wildlife Conservation Strategy (CWCS). The CWCS includes information relating to the distribution, abundance, habitat requirements, threats, management goals, and monitoring techniques for each of these species. North Dakota uses a different system to rank species in greatest need of conservation, from Level I (greatest need) to Level III (moderate need). Within

these ranks, the state also designates the abundance of the species as rare, uncommon, fairly common, common, or abundant.

Following are examples of some of the threatened and endangered species in the EOR Region:

The whooping crane (*Grus americanus*) is one of the world's rarest birds. It annually migrates through the EOR Region, traveling from the species' breeding grounds in Canada's Northwest Territories to the Gulf Coast of Texas, returning northward in spring. Whooping cranes inhabit marshes and prairie potholes in the summer. In winter, they inhabit coastal marshes and prairies. This species has had its critical habitat designated by USFWS, but this habitat sits outside of the 100-mile project area.

Whooping Cranes



Source: (Anonymous, 2008b).

The black-footed ferret (*Mustela nigripes*) is a member of the weasel family and is closely associated with the extensive grassland habitat in this region, particularly in North Dakota. Historically, black-footed ferrets occupied plains habitat ranging from Texas to southern Saskatchewan. Now black-footed ferrets are limited to seven captive populations and a few wild populations. The black-footed ferret is one of the most endangered mammals in the United States (USDOI, 2008b).

Black-footed ferret



Source: (Hagerty, 2005).

The paddlefish is a fish species at risk in the Missouri River of Montana and North Dakota. The cause of decline for this species is loss of habitat due to channelization and impoundment. Any construction activities that result in channelizing or impounding portions of rivers where paddlefish live may amplify the decline.

Paddlefish



Source: (USDOJ, No Date; IDNR, No Date).

5.3.2.4 Wildlife Typically Found in the Region

Many bird, mammal, reptile, and amphibian species remain in the ecoregions covering the year-round.

Common wildlife species include the mule deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), long-eared myotis (*Myotis evotis*), and yellow-bellied marmot (*Marmota flaviventris*).

Mule deer



Source: (Zahm, 2008).

The prairie pothole wetlands and grasslands in this province are home to a variety of wildlife species, including both game (legally hunted) species, and non-game (legally protected, but not endangered or threatened and not hunted) species. Species such as the northern pintail (*Anas acuta*), green-winged teal (*A. crecca*), American wigeon (*A. americana*), and canvasback (*A. valisneria*), while not threatened or endangered may be declining due to wetland destruction or degradation in some areas.

Northern Pintail



Source: (Menke, 2008).

A variety of native reptiles, amphibians, birds, aquatic insects, mussels, and crustaceans also thrive in and around wetlands in this region. The Canadian toad (*Bufo hemiophrys*), snapping turtle (*Chelydra serpentina*), smooth green snake (*Opheodrys vernalis*), northern redbelly snake (*Storeria occipitomaculata*), silver-spotted skipper (*Hesperia comma*), great blue heron (*Ardea herodias*), northern prairie skink (*Eumeces septentrionalis*), pearl dace (*Margariscus margarita*), three-ridge mussel (*Amblema neislerii*), and giant floater mussel (*Pyganodon grandis*) are some of the more common aquatic species in this area, especially near the Red River (Bailey, 1995; EOE, 2009; Montana Field Guide, 2010; NDGFD, 2011; MNDNR, 2011)..

5.3.2.5 Vegetative Habitat Typically Found in the Region

Vegetation in the EOR Region ranges from prairie to mixed forest to a relatively narrow zone of alpine habitats.

Vegetative cover in the Laurentian Ecoregion Province is dominated by forested habitats. Mixed forest stands are made up of several species of conifers, particularly white pine (*Pinus strobus*), along with a mix of deciduous trees. Typical cover consists of mixed pine with aspen-birch, white pine, red pine (*Pinus resinosa*), jack pine (*P. banksiana*), black spruce (*Picea mariana*), eastern hemlock (*Tsuga canadensis*), balsam fir (*Abies balsamea*), and white cedar (*Thuja occidentalis*), among others (Bailey, 1995).

Vegetative cover within the Eastern Broadleaf Forest Province is also dominated by forested habitats. Typical vegetative cover consists mainly of oak-hickory forests with increasing prevalence of maple-beech forests and elm (*Ulmus* spp.) in wetter areas. This province typically has a well-developed understory made up of flowering dogwood (*Cornus florida*), sassafras (*Sassafras albidum*), and hop hornbeam (*Ostrya virginiana*) along with other shrubs, evergreens, and wildflower species. Existing wetland types include cattail marshes, wooded wetlands/swamps, and wet meadows (EOE, 2009).

Vegetative cover within the Prairie Parkland (Temperate) Province is dominated by tallgrass prairie and some riparian deciduous forest habitats. Typical vegetative cover consists of a variety of grasses—big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium*

scoparium), switchgrass (*Panicum virgatum*), and Indian grass (*Sorghastrum nutans*). Extensive areas of prairie-pothole wetlands and oak-hickory forests still remain. Upland forest (white oak-shagbark hickory) occurs on more-dissected land, grading into bottomland forests and wet bottomland prairies along rivers.

Vegetative cover within the Great Plains Steppe Province is dominated by nearly level and rolling plains habitats. Most of this land consists of young glacial drifts and dissected till plains. Typical vegetative cover consists of various tall and short grasses, including little bluestem and blue grama (*Bouteloua gracilis*). Other species include buffalograss (*Bouteloua dactyloides*), needle-and-thread grass (*Hesperostipa comata*), galleta (*Pleuraphis jamesii*), sunflower (*Helianthus annuus*), and goldenrods (*Solidago* spp.). Wetlands in this province include pothole lakes and streams (Stewart and Kantrudi, 1972).

Agriculture has replaced much of the native vegetation (primarily grasses) in the Great Plains Palouse Dry Steppe Province. Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) are the more prominent species in the arid western portion of this area. Many areas are too dry to support forest vegetation; however, ponderosa pine (*Pinus ponderosa*), juniper (*Juniperus communis*), and some aspen (*Populus* spp.) inhabit areas of North Dakota. Common shrubs growing in draws and along streams include the Western snowberry (*Symphoricarpos occidentalis*), prairie rose (*Rosa arkansana*), buffaloberry (*Shepherdia* spp.), chokecherry (*Prunus virginiana*), and sagebrush (*Artemisia* spp.).

Palouse prairie mixed with agriculture



Source: (USDOI, 2003).

The Middle of the Rocky Mountain Steppe ecoregion is a small sliver of land starting at the continental divide in Glacier National Park and extending east. Altitudinal zones are prominent features of this ecoregion province. Below the subalpine zone, Douglas-fir (*Pseudotsuga menziesii*) is the dominant coniferous tree species. Lodgepole pines (*Pinus contorta*) occur

primarily in the eastern part of the province. A semi-desert vegetation of sagebrush or grass-covered steppe covers the lower-elevation slopes of the mountains and plains (Bailey, 1995). In addition to the extensive conifer forests, the ecoregion contains several other plant communities: alpine meadows, grasslands, wooded riparian stands, and higher-elevation treeline/alpine communities (Bailey, 1995; EOE, 2009; Montana Field Guide, 2010; NDGFD, 2011; MNDNR, 2011).

Invasive, non-native, plant species—many of which are also designated as noxious weeds incurring legal regulations—pose a serious threat to the natural areas in this region. Invasive species expected to develop substantial issues or already producing problems in this region include: spotted knapweed (*Centaurea maculosa*), leafy spurge (*Euphorbia esula*), Canada thistle (*Cirsium arvense*), yellow toadflax (*Linaria vulgaris*), Russian knapweed (*Acroptilon repens*), and field bindweed (*Convolvulus arvensis*), to name only a few (CIPM, 2010).

5.3.2.6 Wetlands and Waterways

Wetland types in the EOR Region include:

- Palustrine forested/scrub shrub wetlands (swamps and bogs);
- Palustrine emergent wetlands (marshes, fens, wet meadows, sedge meadows, wet prairies);
- Lacustrine wetlands (lakes);
- Palustrine open water (ponds);
- Riverine habitat (rivers and streams);
- Prairie potholes; and
- Kettle wetlands.

This region has high concentrations of temporary and seasonal emergent pothole and kettle wetlands that create favorable conditions for duck nesting and migration (Bryce et al., 1996; Woods et al., 2002). The wetlands are generally smaller and scattered in isolated depressions, known as prairie potholes, and swamps tend to be scrub-shrub swamps rather than forested.

Prairie pothole region map—Left; Aerial photo of prairie pothole region –Right



Source: (USDOI, 2011b; Anonymous, 2008c).

High-density, dendritic (a branching pattern) drainages are common in the northwestern glaciated plains. These drainages typically occur in areas of exposed marine shales where first-order streams feed into long, structurally controlled, second and third-order streams with low gradients.

Major rivers include the Red, Roseau, Red Lake, Crow Wing, Minnesota, and North Fork Crow in Minnesota; the Red, Pembina, Tongue, Park, and Forest rivers in North Dakota; and the Foothill Grassland River Breaks, Milk, St. Mary, and Marias rivers in Montana. Numerous smaller rivers, streams, and tributaries (perennial and intermittent) also flow throughout the region.

The entire Missouri River, including the section in eastern Montana, is under examination by the Army Corps of Engineers (Omaha District) to improve the natural functioning of the river through the ACOE's Missouri River Recovery Program.

5.3.2.7 Aquatic Resources in the Region

Aquatic resources are highly regarded within the East of the Rockies Region because these aquatic resources support an abundance of ducks, game, and fish. Abundant lakes, rivers, ponds, and wetlands—the remnants of glacial recession—are dominant features on the landscape. One of the Great Lakes, Lake Superior, borders this region on the east side of Minnesota (Bailey, 1995; EOE, 2009).

These aquatic resources support a diverse fishery. Notable fish species include lake sturgeon (*Acipenser fulvescens*), channel catfish (*Ictalurus punctatus*), walleye (*Sander vitreus*), northern pike (*Esox lucius*), muskellunge (*E. masquinongy*), smallmouth bass (*Micropterus dolomieu*), brook trout (*Salvelinus fontinalis*), lake trout (*S. namaycush*), yellow perch (*Perca flavescens*), white sucker (*Catostomus commersonii*), and the common shiner (*Luxilus cornutus*). Various native reptiles, amphibians, waterbirds, aquatic insects, mussels, and crustaceans also thrive in these waters (USDOC, 2010).

Several very large lakes are located within the Minnesota portion of the project area (Mullet, Mille Lacs, Leech, Gogebic, Mud, Kabetogama, Rainy, and Vermilion lakes, Red Lakes, and Lake of the Woods). Numerous smaller lakes and ponds also fall within this area.

Accidental introductions of invasive species have serious impacts on aquatic resources, damaging fisheries and native habitats. Invasive aquatic animal species of concern, also called aquatic nuisance species, include the rusty crayfish (*Orconectes rusticus*), sea lamprey (*Petromyzon marinus*), zebra mussels (*Dreissena polymorpha*), quagga mussels (*Dreissena rostriformis bugensis*), and the silver carp (*Hypophthalmichthys mitrix*), among many others (USDA, 2003).

5.4 GEOLOGY AND SOILS

5.4.1 INTRODUCTION

The geology and soils in the East of the Rockies Region in the Northern Border study area vary widely throughout the region. Geology can be described as the study of the earth's history through rock formations. These rocks often serve as the parent rock for soils present at and below the surface. The topography of a given area on earth can be described as its surface, shape, or features.

This section addresses the geologic conditions in the East of the Rockies Region and describes the potential impacts of U.S. Customs and Border Protection (CBP) program alternatives on geologic resources. The study area contains slightly different topographic features ranging from the relatively flat plains from Montana through North Dakota, followed by the lake region of Minnesota. Geologic formations ranging from glacial deposits to the Canadian Shield are present within the East of the Rockies Region and have been shaped over thousands of years by glacial, water, and wind mechanisms.

5.4.2 AFFECTED ENVIRONMENT

5.4.2.1 Physiographic Provinces

Four physiographic divisions span the East of the Rockies Region. These divisions are subdivided into provinces as well as some sections (Figure 5.4-1, Table 5.4-1).

The Northern Rocky Mountains are the westernmost physiographic division along the Northern Border and is a part of the larger Rocky Mountain system (the Rockies). To the east, the Missouri Plateau borders the northern Rockies. The Missouri Plateau is a part of the Interior Plains division, and is divided into two sections: glaciated and unglaciated. The Western Lake section of the Central Lowland province borders the Missouri Plateaus. Finally, the Superior Upland is the last province in the East of the Rockies Region. Table 5.4-1 provides details on the geology of these areas. Appendix N features a geologic time scale showing the ages of the geologic time periods with which rock formations are dated.

1
2

Figure 5.4-1. Physiographic Provinces, Divisions, and Sections of the East of the Rockies Region

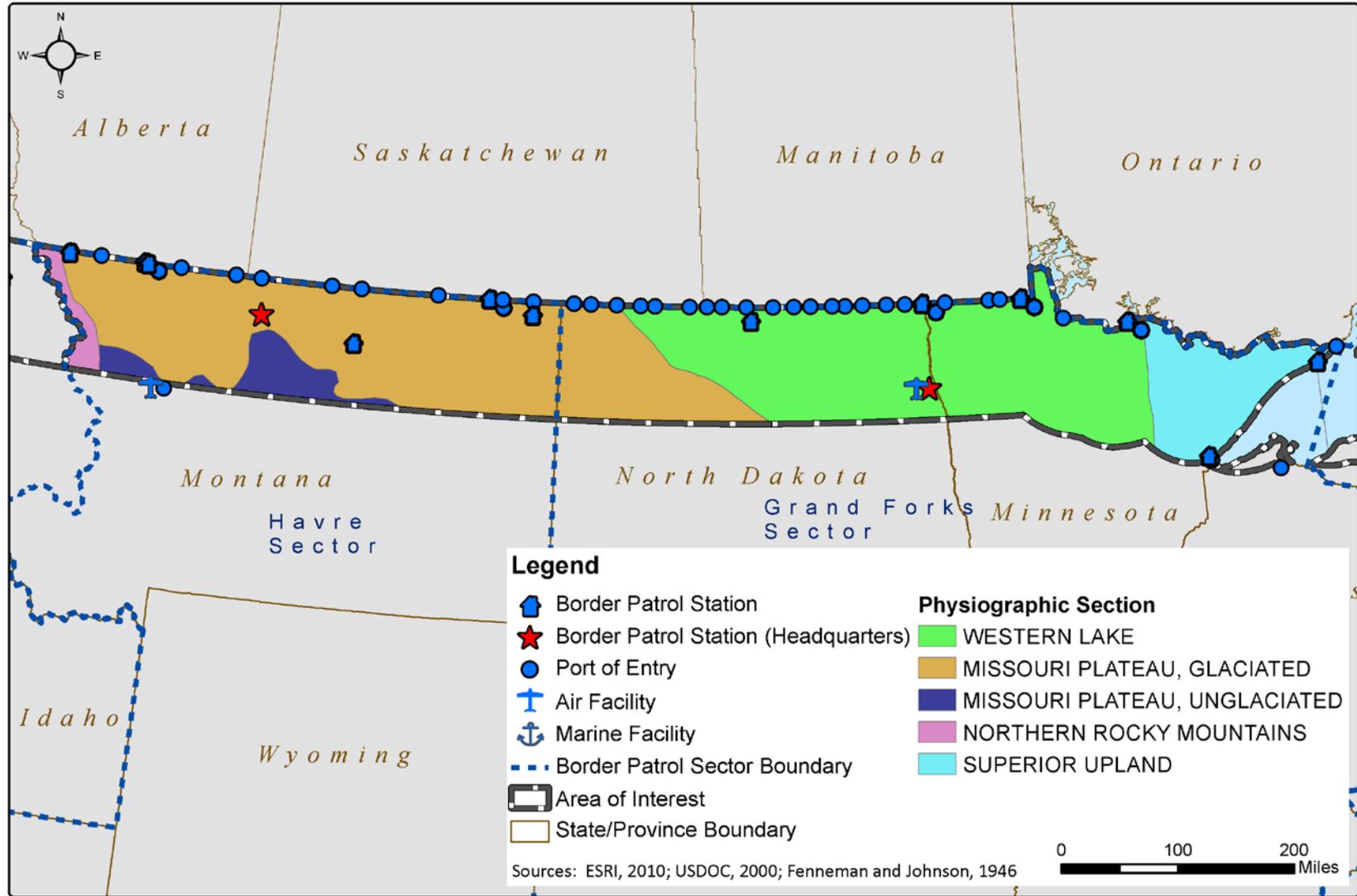


Table 5.4-1. Physiographic Provinces in the East of the Rockies Region

Division	Province	Section	Terrain Texture including Topography	Geologic Structure and History	Generalized Rock Types
Rocky Mountain System	Northern Rockies	N/A	Steep, glaciated mountains and peaked alpine ridges. Elevations range from 3,000 to 10,000 ft (920 to 3,100 m).	The Northern Rockies formed during the Laramide Orogeny, about 70 to 40 million years ago. Likely cause of Rocky Mountains development is an unusual oceanic subduction under the North American Plate. Most plates subduct at a high angle; the subduction that formed the Rockies occurred at a lower angle (USDOT, 2000).	Rock types include Precambrian sedimentary deposits (partially metamorphosed), upper Tertiary sedimentary deposits, and glacial deposits (USDOT, No Date).
Interior Plains	Great Plains Province	Missouri Plateau, Glaciated	Elevation ranges from 2,500 to 5,000 ft (763 to 1,525 m). Level to gently rolling continental glacial till plains with steep slopes bordering some of the larger rivers (USDOT, 1994). Includes kettle holes and moraines. Rocks deposited during glaciation also occur, mostly 1 to 2 feet (0.3 to 0.6 m) in diameter; some nearly 5 feet (1.5 m).	Extreme advance of continental icesheets influenced topography. As the sheets thinned, gradually gave way to scattered boulders that indicate the edge of the glaciated Missouri Plateau from the unglaciated Missouri Plateau (Fenneman, 1928).	Beneath glacial till are soft Cretaceous marine shales and Lower Tertiary non-marine sedimentary rocks (USDOT, 1994).
Interior Plains	Great Plains Province	Missouri Plateau, Unglaciated	Topography due to degradation, with extensive fluvial terraces. Monadnocks or exhumed mountains show degradation. Recent erosion has created badlands (Fenneman, 1928).	Unglaciated plains, from which the original sedimentary surface has been entirely stripped (Fenneman, 1928).	Beneath glacial till are soft Cretaceous marine shale and Lower Tertiary non-marine sedimentary rocks (USDOT, 1994).

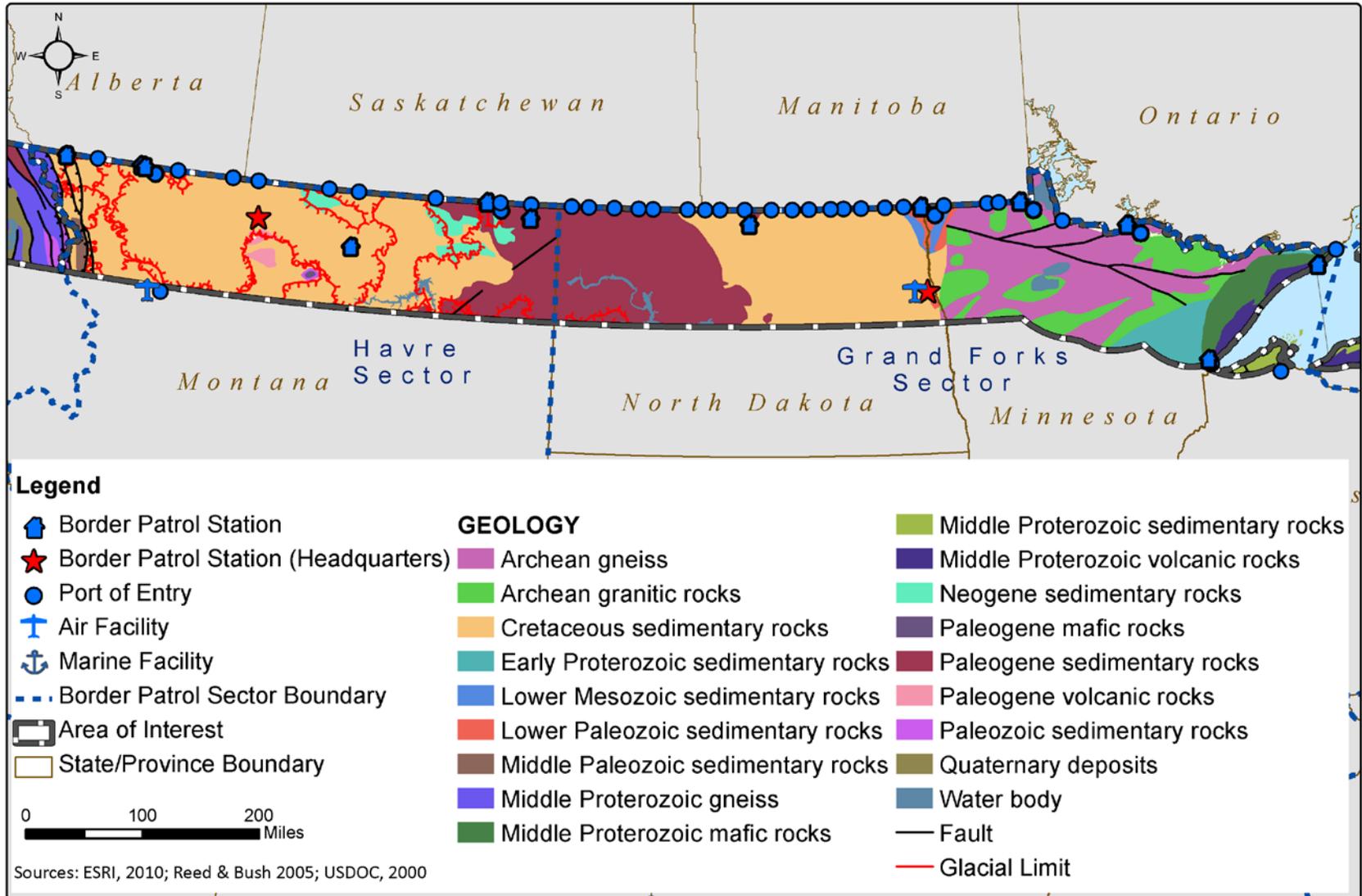
Division	Province	Section	Terrain Texture including Topography	Geologic Structure and History	Generalized Rock Types
Interior Plains	Central Lowland	Western Lake	In the north, rolling hills, minimally eroded, and poorly drained land (Fenneman, 1928).	Northern portion has a vast lacustrine plain, evidence of glacial Lake Agassiz. Includes flat and broad valley of the Red River of the North (Fenneman, 1928).	Glacial till on Cretaceous marine shale.
Laurentian Upland	Superior Upland	N/A	Elevation ranges from 600 to 2,280 ft (183 to 695 m). Most prominent of the uplands are elevated linear features trending southwest-northeast along the Lake Superior shore and parallel ranges of Meabi and Vermillion in the north (USDOI, 1994).	Known as the Canadian Shield, the Superior Upland is the largest American surface exposure of the ancient (2.6 to 1.6 billion years old) core of the North American continent (USDOI, 2000).	Mostly Precambrian metamorphic rocks and overlying Paleozoic rocks (Cambrian) covered by thin veneer of glacial deposits from melting glaciers at the end of the Pleistocene (USDOI, 2004b).

1 **5.4.2.2 Geologic Conditions**

2 The geologic conditions within the East of the Rockies Region are extremely complex,
3 resulting from tectonic and related activities (e.g., faulting, volcanic activities, and
4 seismic sea waves) and glacial activities along with erosive actions of wind and water.
5 The East of the Rockies Region contains consolidated geologic formations consisting of
6 sedimentary, igneous, and metamorphic rocks. The East of the Rockies Region also
7 contains unconsolidated geologic formations consisting of alluvium, terrace deposits,
8 glacial deposits and other mixtures of sands, silts and clays with various mixtures of
9 rocks. The geologic formations are shown on Figure 5.4-2.

1
2

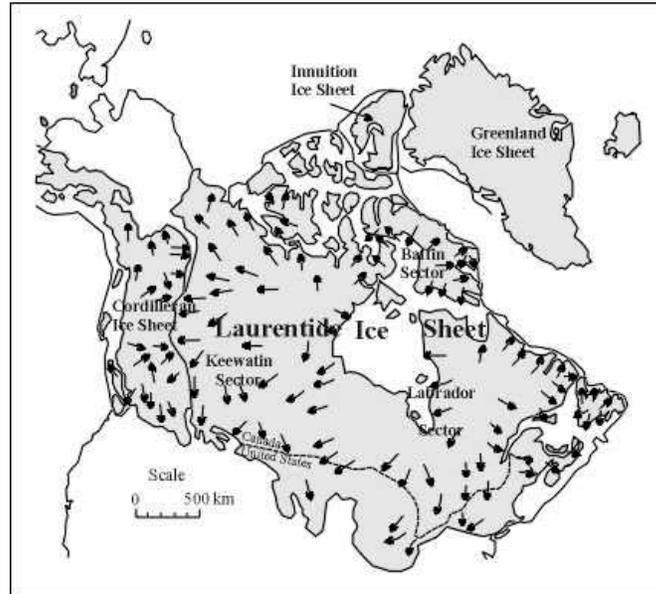
Figure 5.4-2. Geologic Conditions of the East of the Rockies Region



1 **Regional Glaciation**

2 During the last ice age, two ice sheets extended over the Canadian border into the United
3 States. The Laurentide sheet covered much of the East of the Rockies Region (Figure
4 5.4-3). In addition to ice sheets, mountain glaciers also expanded in high elevations.

5 **Figure 5.4-3. Extent of the Laurentide Ice Sheet**



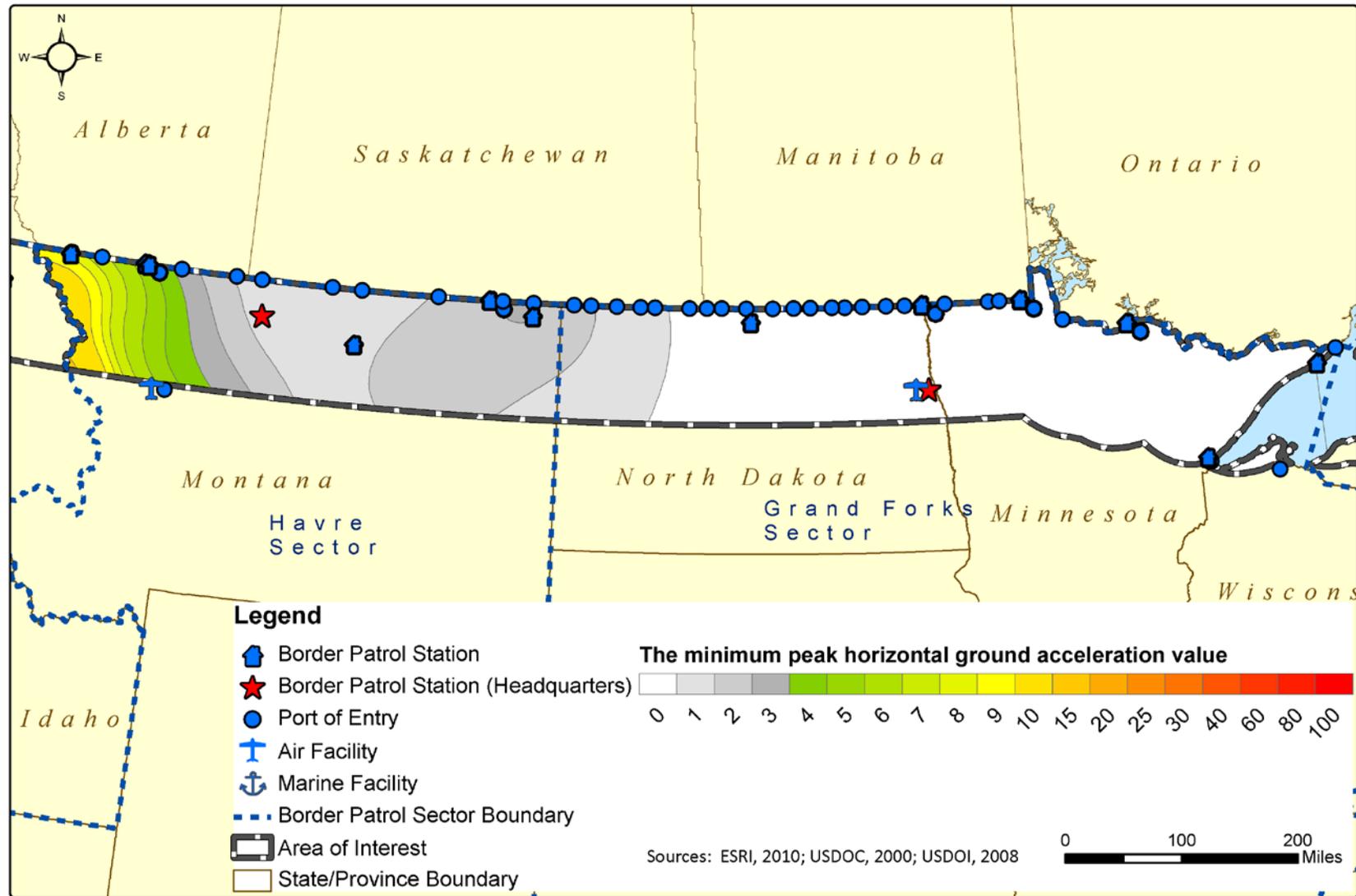
6
7 The effects of glacial advances remain apparent in the northern United States. Polished
8 and striated outcroppings, rounded hills, moraines, valley fills of glacial till and outwash,
9 and other typical glacial features are evidence of Pleistocene glaciation. All along the
10 Northern Border, till deposits, erratics, and moraines are common (Nelson, 2003). Till, a
11 sedimentary deposit derived from glacial erosion, was deposited throughout the northern
12 United States as the ice sheets receded.

13 **Seismicity and Tectonics**

14 Seismic activity in the East of the Rockies Region is rare but can occur in the far reaches
15 of Montana within the study area (Figure 5.4-4). This location is adjacent to the
16 Intermountain Seismic Belt described in Appendix N, Geology and Soils. The U.S.
17 Geological Survey (USGS) describes this value as the fastest speed of horizontal particle
18 movement at ground level due to an earthquake.

19

Figure 5.4-4. Seismicity in the East of the Rockies Region



1 **Landslides**

2 Much of the East of the Rockies Region is susceptible to landslides due to slopes and
3 shale bedrock (Figure 5.4-6). While most of the region has a low incidence of slides, it
4 also has large areas that are moderately to highly susceptible. In the East of the Rockies
5 Region, most landslides occur because of rainfall events, snowmelt, and human activities
6 (State of Montana, 2004).

7 **Figure 5.4-5. Landslide**



17 Source: USGS, 2011.

18 **Karst Topography**

19 Often the existence of karst topography is related to aquifers. In the East of the Rockies
20 Region, karst landscapes are not found anywhere except in small locations in Montana
21 (Figure 5.4-7). These areas of karst are long formations, over 1,000 ft, in various types of
22 carbonate rock. Appendix N provides explanations on karst terrain.

Figure 5.4-6. Landslide Incidence in the East of the Rockies Region

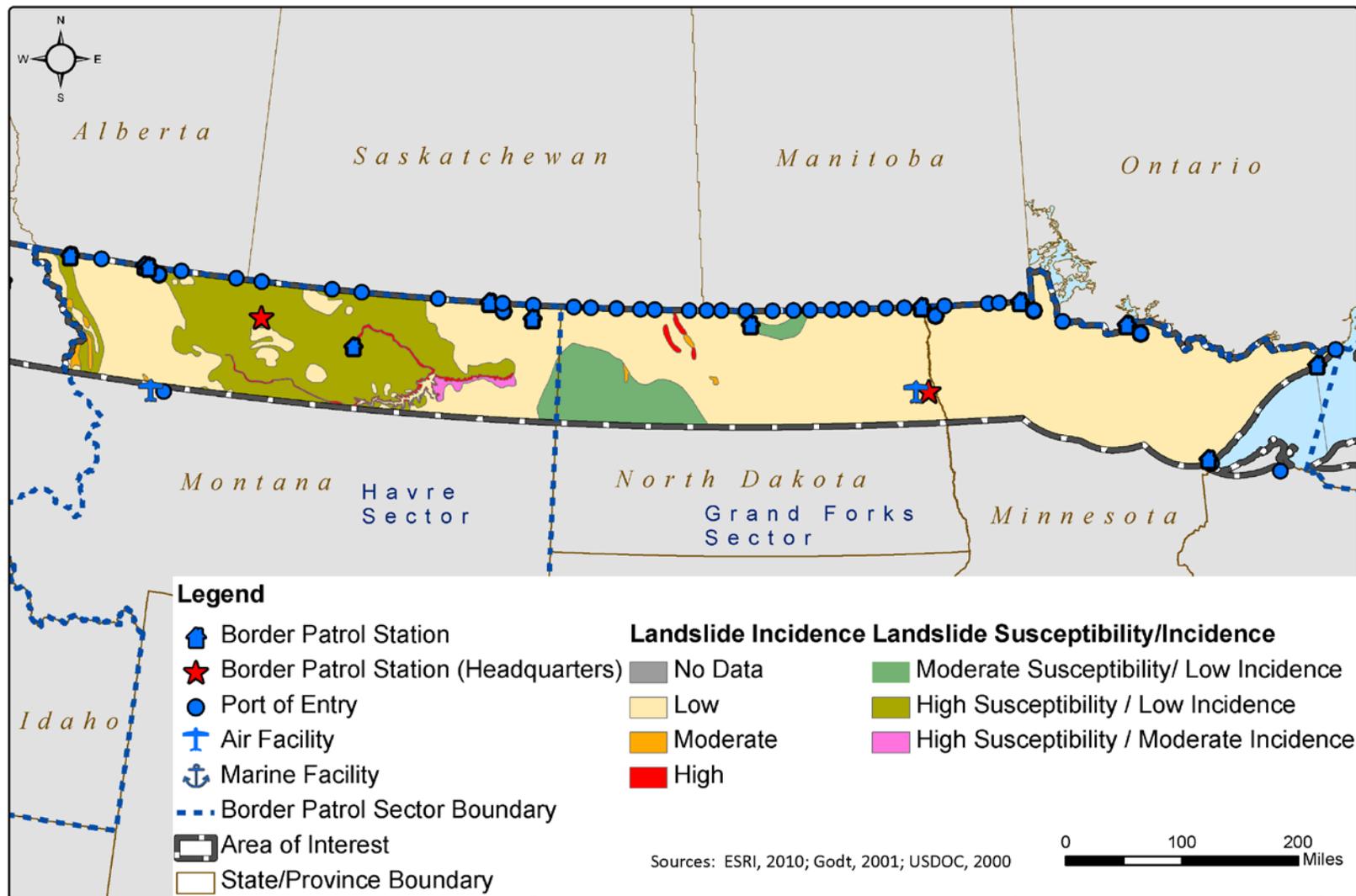
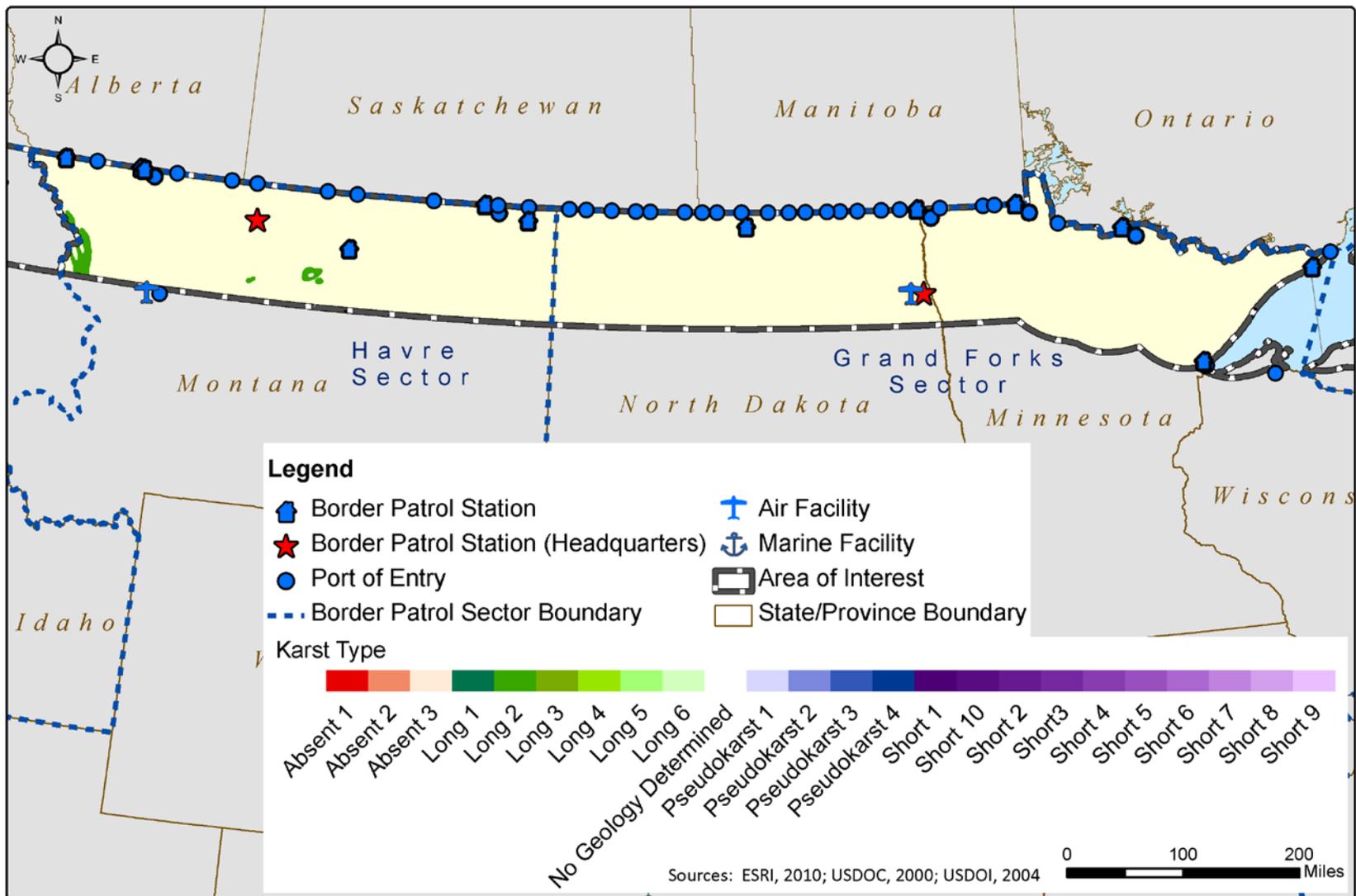
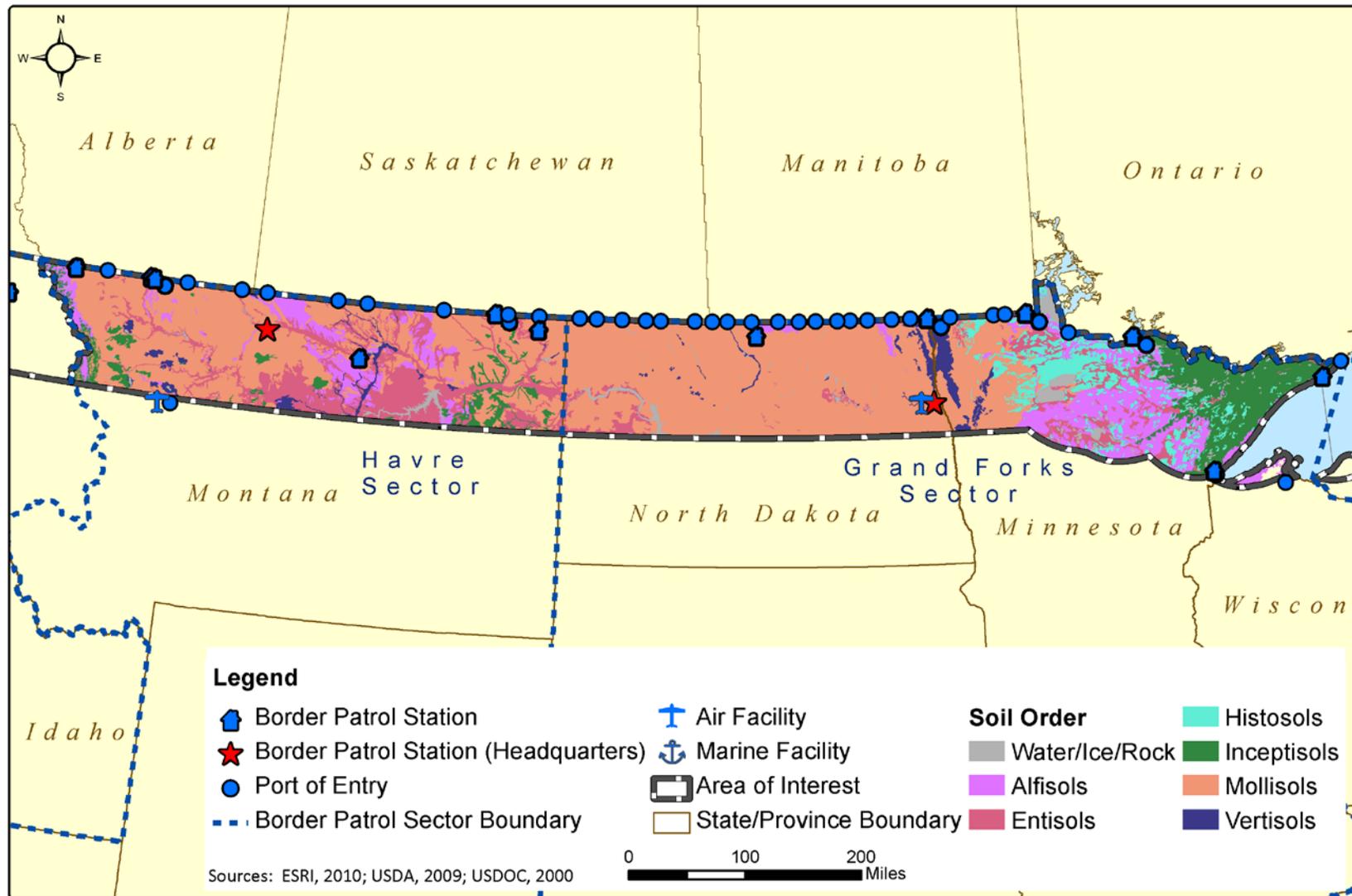


Figure 5.4-7. Karst Topography in the East of the Rockies Region



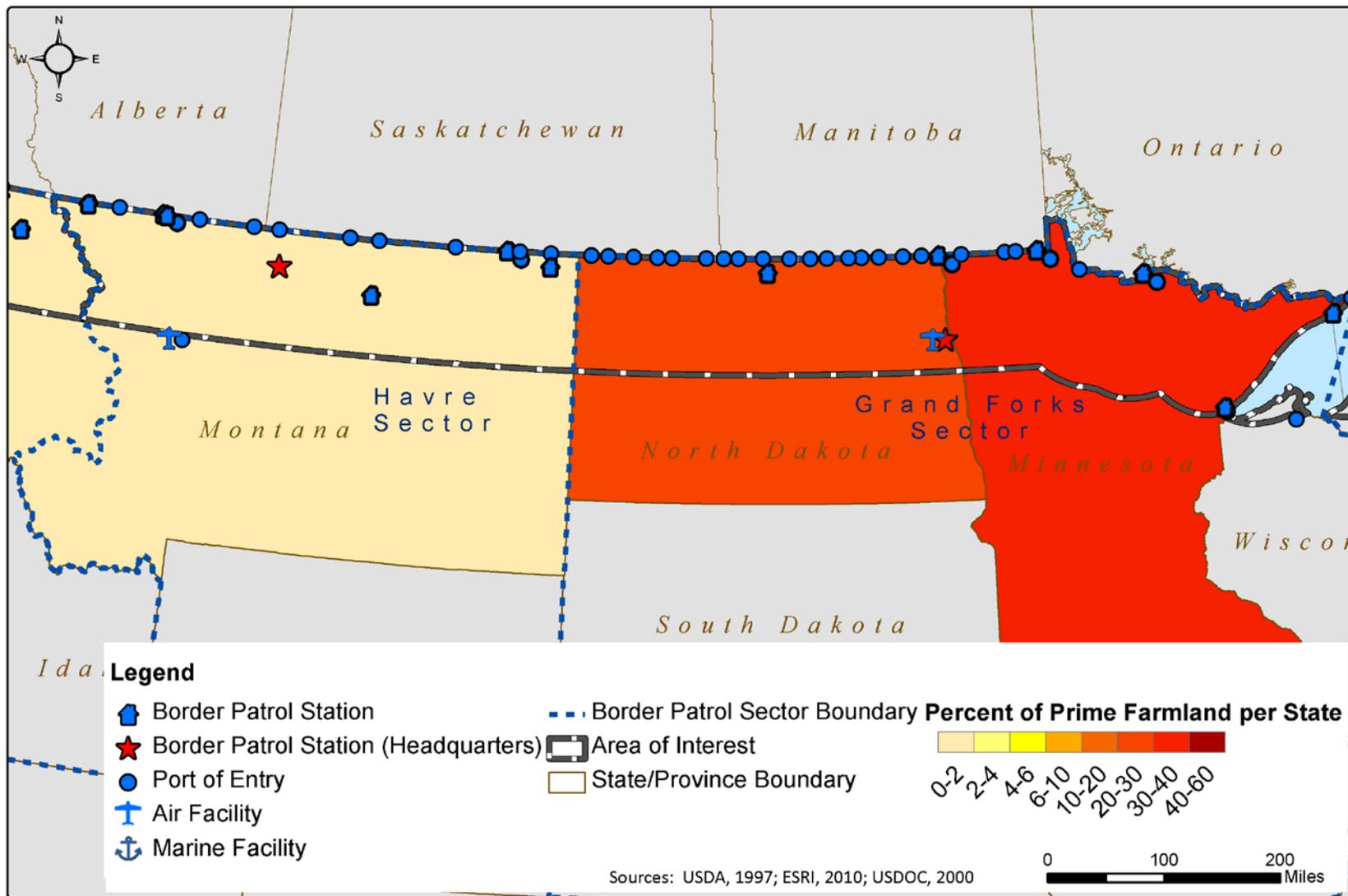
1

Figure 5.4-8. Soil Orders in the East of the Rockies Region



2

Figure 5.4-9. Prime Farmland in the East of the Rockies Region



1 **5.5 WATER RESOURCES**

2 **5.5.1 INTRODUCTION**

3 Water resources are distributed widely throughout the 100-mile Programmatic Environmental
4 Impact Statement (PEIS) study corridor in the states of Minnesota, North Dakota, and Montana
5 east of the Continental Divide. For the purposes of this study, this resource area consists of
6 hydrologic and groundwater resources (aquifers, subterranean watercourses, and recharge areas),
7 surface water and waters of the United States (lakes, ponds, rivers, streams, and channels), and
8 floodplains. Water resources include several beneficial elements, such as water supply quantity
9 and quality, habitat for aquatic organisms, recreation, and flood storage capacity, which are
10 subject to effects from proposed activities.

11 **5.5.2 AFFECTED ENVIRONMENT**

12 **5.5.2.1 Groundwater**

13 Groundwater resources are sources of water that result from precipitation infiltrating the ground
14 surface. Groundwater is contained in either confined reservoirs or unconfined aquifers. Where
15 the water table or piezometric surface reaches the ground surface, groundwater will reappear as
16 either streams, surface bodies of water, or wetlands. This exchange between surface water and
17 groundwater is an important feature of the hydrologic cycle.

18 Groundwater has a variety of beneficial uses. In the East of the Rockies Region, as in the rest of
19 the country, groundwater is a primary source for a wide variety of water uses including
20 irrigation, domestic water supply, fish propagation, commercial water supply, industrial uses,
21 and livestock. Table 5.5-1 shows the categories of groundwater use for states within the East of
22 the Rockies Region.

23 **Table 5.5-1. Water Use in the East of the Rockies Region in 2005**

State	Irrigation Use (%)	Public Water Supply (%)	Industrial Use (%)	Rural Domestic, Livestock (%)
Montana	96.5	1.3	1.6	0.6
North Dakota	11.3	5	80.6	2.8
Minnesota	6.0	13.3	74.6	6.2

24 Source: (Kenny et al., 2009).

25 Groundwater occurs in porous geologic formation layers called aquifers, which may be large and
26 regional, such as the Ogallala Aquifer that underlies many states in the Great Plains. Aquifers
27 may also be very small and localized.

28 Five major aquifers of the Northern Great Plains Aquifer System have a coverage area of
29 approximately 300,000 square miles underneath nearly all of North Dakota and half of Montana.
30 These five aquifers include the lower Tertiary, upper Cretaceous, lower Cretaceous, upper
31 Paleozoic, and lower Paleozoic aquifers. Most of the system lies in the structural troughs
32 identified as the Williston Basin (North Dakota) and Powder River Basin (Montana).

1 Recharge into the aquifer system results mostly from rainfall and snow melt. Nearly all of the
2 recharge occurs through areas of outcrop along aquifers exposed by erosion. Streams also play a
3 key role in the aquifer recharge. Water from streams percolates through stream beds into the
4 aquifers near outcrops. Some recharge occurs as a result of over-irrigation. This minor form of
5 recharge occurs in only a few places.

6 The lower Tertiary and upper Cretaceous aquifers in the system both have local flow systems.
7 Highly mineralized and saline water moving in the aquifer takes short flow paths into lakes,
8 streams, and springs. Other parts of the aquifer system have long, regional flow paths from areas
9 at high altitudes following the dip of the aquifers. A large majority of this water flows through
10 the Williston and Powder River basins along long flow paths that are usually very deep, due to
11 the great depth of the aquifers (Vogelsberg, 2007).

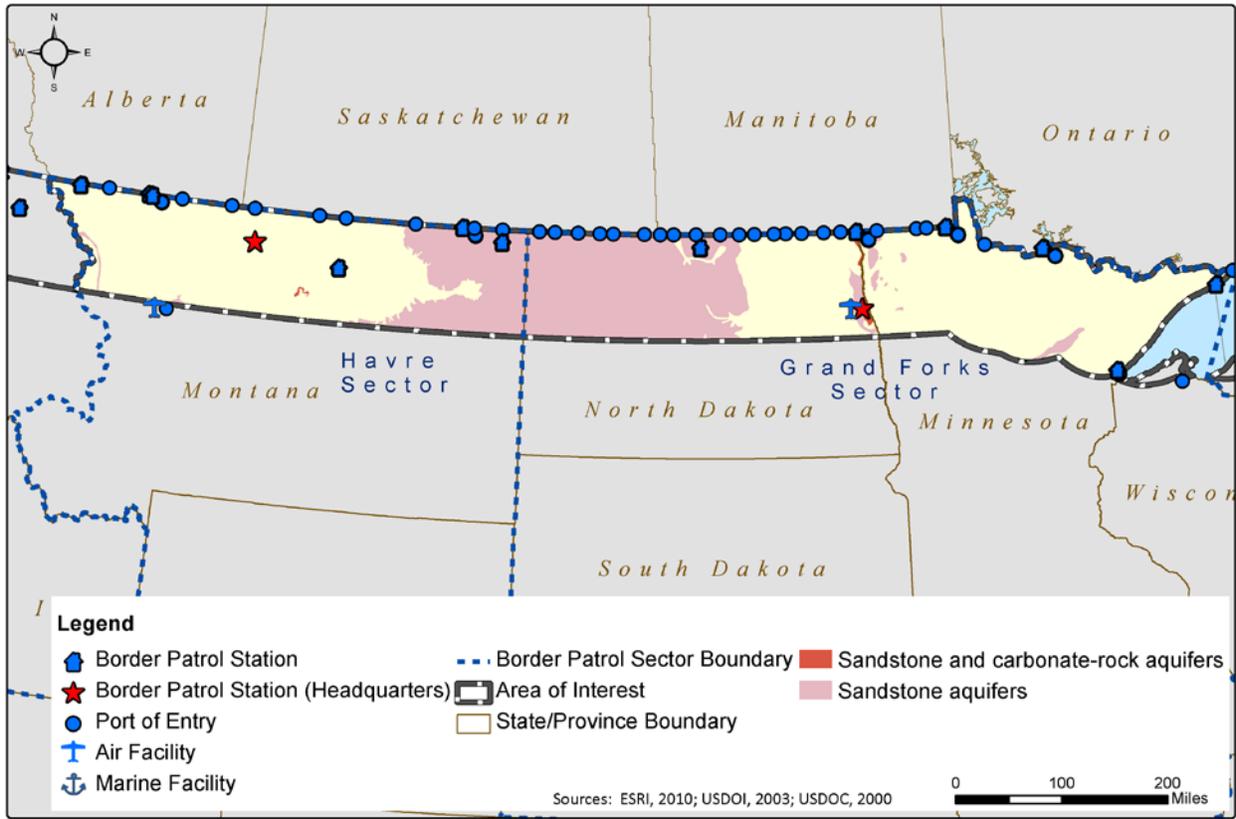
12 The occurrence of groundwater in Minnesota is related primarily to local geologic conditions
13 that determine the type and properties of aquifers. Within the 100-mile corridor of the East of
14 the Rockies Region, the aquifers occur in two general geologic settings. The first is bedrock
15 made of hard and very old igneous and metamorphic rocks. Groundwater in these rocks occurs
16 mostly in fractures that may not yield usable quantities of water. The other setting is
17 unconsolidated sediments deposited by glaciers, streams, and lakes (MDNR, 2011).

18 The unconsolidated glacial sediments in the northwest are typically clayey and may contain
19 limited-extent surficial and buried sand aquifers. The fractured bedrock here is usually buried
20 deep beneath the glacial sediments and is only locally used as an aquifer (MDNR, 2011).

21 The unconsolidated sediments in the northeast are thin or absent and are therefore not used or are
22 relatively unimportant, except in major river valleys where sediment thickness is greater. These
23 sediments are underlain by hard fractured bedrock that typically has limited groundwater yield
24 (MDNR, 2011).

1

Figure 5.5-1. East of the Rockies Groundwater Aquifers



2

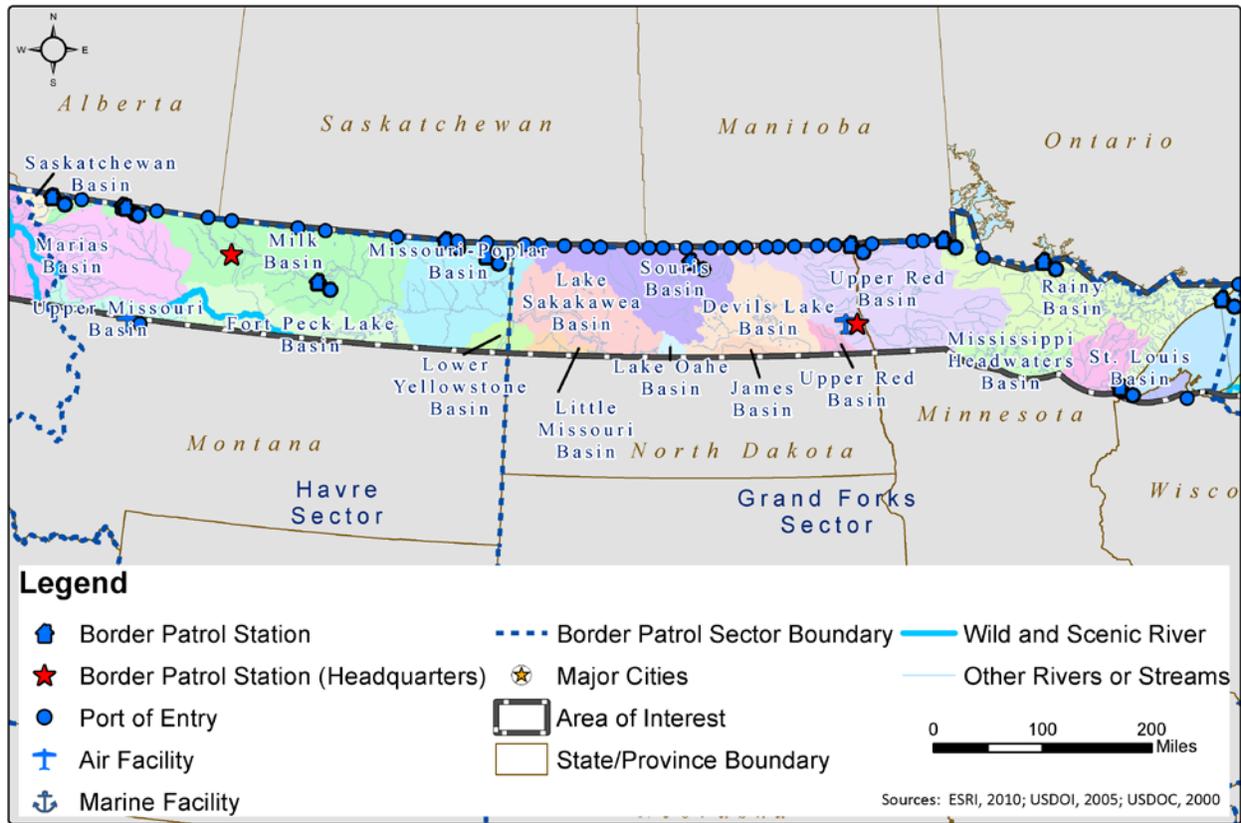
3 **5.5.2.2 Surface Waters and Waters of the United States**

4 Surface water is water found in lakes, rivers, ponds, wetlands, and oceans. It is the most
 5 abundant and visible form of water resource, with the greatest variety of uses. In addition to
 6 irrigation, domestic water supply, fish propagation, commercial water supply, industrial uses,
 7 and livestock, surface water supports recreation, fish and wildlife habitat, hydropower, and
 8 transportation. Section 5.3.2.7 provides a discussion of the regional affected environment for
 9 aquatic resources. Surface water is often identified by the basin or watershed in which it
 10 is found. A watershed is simply the topographic area defined by the drainage of a single body of
 11 water.

12 There is one designated Wild and Scenic River within the 100-mile corridor of the East of the
 13 Rockies Region: the Upper Missouri River in Montana. Figure 5.5-2 shows this Wild and Scenic
 14 River as well as the other river basins found within the 100-mile corridor for the East of the
 15 Rockies Region.

1

Figure 5.5-2. River Basins in the East of the Rockies Region



2 The upper Missouri River Basin occupies 56 percent of the state of Montana and all of the area
 3 within Montana’s 100-mile corridor for the East of the Rockies Region. Water discharged from
 4 the state of Montana through this basin averages 7.3 million acre-feet per year. The basin
 5 includes the Jefferson, Madison, Gallatin, Dearborn, Smith, Sun, Teton, Marias, Judith, and
 6 Musselshell river basins, which enter the river above Fort Peck Reservoir, and the Milk River,
 7 which enters below the reservoir. The river receives about 450,000 acre-feet of water from the
 8 Canadian portion of the basin (MRBC, 1981).

9 There are several reservoirs in the basin. The largest is the Fort Peck reservoir, which has a
 10 storage capacity of 19 million acre-feet. The combined storage capacities of the Canyon Ferry
 11 and Elwell (Tiber) reservoirs are 3.3 million acre-feet. There are 38 reservoirs in the basin with
 12 storage capacities exceeding 5,000 acre-feet. In addition, there are several thousand small
 13 reservoirs and stock ponds used for irrigation, flood prevention, and stock watering (MRBC,
 14 1981).

15 The Souris River originates in the Province of Saskatchewan, crosses into the East of the Rockies
 16 100-mile corridor in North Dakota, and then crosses into Manitoba before joining the
 17 Assiniboine River and ultimately the Red River. Its total length is approximately 435 miles. The
 18 river valley is flat and shallow and its semi-arid prairie is cultivated. Major reservoirs are found
 19 in both the American and Canadian portions of the basin, including Boundary, Rafferty, and
 20 Alameda Reservoirs in Saskatchewan, and Lake Darling in North Dakota. The basin also
 21 includes a number of wildlife refuges and small impoundments along the American portion of
 22 the river (IJC, 2011).

1 The Red River of the North Basin stretches from northeastern South Dakota and west-central
2 Minnesota northward through eastern North Dakota and northwestern Minnesota into southern
3 Manitoba. It ends where the Red River empties into the southern end of Lake Winnipeg (MPCA,
4 2010). It is an international and multi-jurisdictional area, approximately 45,000 square miles in
5 size, and includes the Devil's Lake Basin (3,180 square miles) in North Dakota. The Assiniboine
6 River joins the Red River in downtown Winnipeg. Nearly 40,000 square miles of the basin is in
7 the United States; the remaining 5,000 square miles are in Canada (RRB, 2000).

8 **Figure 5.5-3. Rainy River Basin in Minnesota**



9
10 The Rainy River Basin has a total area of 27,114 square miles, of which 11,244 square miles (41
11 percent) are in Minnesota and 15,870 square miles (59 percent) are in Ontario. The Rainy River
12 Basin is home to many forest and water resources. Voyageurs National Park and the Boundary
13 Waters Canoe Area Wilderness (BWCA) are located within the Rainy River Basin, as are several
14 of the state's walleye fisheries and many trout streams. The majority of the land within the Basin
15 is forested. Prominent uses of natural resources in the Basin are forestry, mining, and various
16 forms of recreation (MPCA, 2001).

17 **5.5.2.3 Floodplains**

18 Floodplain management seeks to preserve the flood storage capacity for the river corridor. This
19 may be achieved in several ways. Local communities often have floodplain management or
20 zoning ordinances that restrict development within the floodplain. The Federal Emergency
21 Management Agency (FEMA) manages the National Flood Insurance Program (NFIP). FEMA
22 also provides floodplain management assistance, including mapping of 100-year floodplain
23 limits, to over 20,000 communities. The information provided by FEMA's flood management
24 program is useful to CBP planners who seek to avoid effects from flooding conditions. This is
25 most relevant for CBP border facilities, such as ports of entry (POE), that are planned at
26 locations where rivers define the Northern Border. Pigeon River and Rainy River, both in
27 Minnesota, are rivers of this type in the East of the Rockies Region.

1 5.5.2.4 **Transboundary Water Agreements**

2 **The International Boundary Waters Treaty Act**

3 This treaty prohibits bulk water removal from boundary basins, requires permitting for water
4 projects that would affect the level or flow of boundary waters, and provides sanctions and
5 penalties for violation.

6 **Agreement for Water Supply and Flood Control in the Souris River Basin**

7 In 1989, Canada and the United States entered into an agreement for water supply and flood
8 control in the Souris River Basin. The agreement involved the construction, operation, and
9 maintenance of reservoir projects in Canada that would provide water supply benefits in Canada
10 and flood control benefits in the United States consistent with the International Boundary Waters
11 Treaty Act.

12

1 **5.6 NOISE**

2 **5.6.1 INTRODUCTION**

3 The study area contains many soundscapes and noise-sensitive receptors that could
4 experience impacts due to the alternatives that U.S. Customs and Border Protection
5 (CBP) is considering. However, the mere presence of a noise-sensitive area, such as a
6 national park, residence, or school, does not guarantee that it would be significantly
7 impacted by CBP’s activities or that the overall impacts would be major under the
8 National Environmental Policy Act (NEPA). As with other topics in this Programmatic
9 Environmental Impact Statement (PEIS), the programmatic approach to describing noise
10 is driven by the planning objective of the document and the potential for actual impacts.

11 **5.6.2 AFFECTED ENVIRONMENT**

12 Sound is a physical phenomenon consisting of vibrations that travel through a medium
13 like air and are sensed by the human ear. Noise is defined as any sound that is
14 undesirable because it interferes with communication, is intense enough to damage
15 hearing, or is otherwise intrusive. Human response to noise varies depending on the type
16 and characteristics of the noise, distance between the noise source and the receptor,
17 receptor sensitivity, and time of day. Noise is often generated by activities essential to a
18 community’s quality of life, such as construction or vehicular traffic.

19 Sound varies by both intensity and frequency. Sound pressure level, in decibels (dB), is
20 used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a
21 sound pressure level to a standard reference level. Because the human ear responds
22 differently to different frequencies, “A-weighting” was developed to approximate the
23 frequency response of the human ear. The A-weighting curve has been widely adopted
24 for environmental noise measurement and is standard in many sound level meters. The
25 dBA levels of common sounds of daily life are provided in Table 5.6-1.

26 **Table 5.6-1. Common Sound Levels**

Outdoor	Sound level (dBA)	Indoor
Snowmobile	100	Subway train
Tractor	90	Garbage disposal
Downtown (large city)	80	Ringling telephone
Freeway traffic	70	TV audio
Normal conversation	60	Sewing machine
Rainfall	50	Refrigerator
Quiet residential area	40	Library

27 Notes: dBA = A-weighted decibel. Sound level provided is as
28 generally perceived by an operator or a close observer of the
29 equipment or situation listed.

30 Source: Harris, 1998.

1 The dBA noise metric describes steady noise levels, although very few noises are, in fact,
2 constant. Therefore, the measurement day-night sound level (DNL) has been developed.
3 DNL is defined as the average sound energy in a 24-hour period with a 10-dB penalty
4 added to the nighttime levels (10 p.m. to 7 a.m.). DNL is a useful descriptor for noise
5 because: (1) it averages ongoing yet intermittent noise, and (2) it measures total sound
6 energy over a 24-hour period. In addition, Equivalent Sound Level (L_{eq}) is often used to
7 describe the overall noise environment. L_{eq} is the average sound level in dB.

8 5.6.2.1 Regulatory Review

9 The Noise Control Act of 1972 (PL 92-574) directs Federal agencies to comply with
10 applicable Federal, state, interstate, and local noise control regulations. In 1974, the
11 USEPA provided information suggesting continuous and long-term noise levels in excess
12 of DNL 65 dBA are normally unacceptable for noise-sensitive land uses such as
13 residences, schools, churches, and hospitals.

14 State and local governments have the opportunity to regulate noise in their jurisdictions.
15 These regulations are typically guidelines for activities that generate noise and the hours
16 that such activities may be performed. Noise is typically regulated at the local level. A
17 municipal noise ordinance might address the hours that heavy equipment can be operated,
18 the distance heavy equipment can be operated in proximity of noise-sensitive receptors
19 (i.e., schools, hospitals, churches, and residences), and the duration of operation of a
20 single noise source considered to be annoying to the public, such as a diesel-powered
21 generator. Some set specific not-to-exceed noise levels, and others are simple nuisance
22 noise ordinances.

23 A number of sources of noise may be addressed for rural areas, such as parades, vendors,
24 social engagements with music, and animal noises. Construction noise is typically
25 exempt from noise ordinances in rural areas. In addition, noise regulations in an urban
26 setting take into account the constant noise sources of urban living, such as large heating,
27 ventilation, and air conditioning (HVAC) units, public transportation (trains and buses),
28 emergency vehicles, and heavy traffic. Because urban noise levels are already relatively
29 high, adding a source for an extended period can be highly annoying to some people,
30 hours of construction and operation of heavy equipment are often limited. A typical
31 ordinance in a major city will restrict construction related noise sources between the
32 hours of 10:00 p.m. and 7:00 a.m.

33 5.6.2.2 CBP Noise Sources

34 The CBP operates 24 hours a day and 7 days a week. The level of operation can be
35 determined by the measures required to secure the border or necessary for normal facility
36 activities. Table 5.6-2 lists CBP's operations and describes of the noise levels of these
37 activities.

Table 5.6-2. CBP Noise Sources

Operation	Description
Use of mobile surveillance systems (MSS) and surveillance towers	Very little noise is generated by the motor. In remote areas, standby generators may be used to supplement electric power.
Firing ranges and armories	CBP conducts small-arms training at many of its ports of entry (POE) and border patrol stations (BPS). Small-arms weapon fire is clearly audible in areas surrounding these ranges during training activities. Usually these activities are limited to daytime hours.
Maritime patrols	Boating noise is typically audible during marine patrols near the shoreline. This noise is widespread and at most locations only sporadic. The watercraft used are generally selected for their noise-suppression features because of the nature of their mission.
Patrols by foot, horse, off-road vehicle (ORV), and snowmobile	Foot and horse patrols are typically quiet. Noise from ORVs and snowmobiles is audible for a mile or more in remote, quiet areas. This noise is widespread and at most locations only sporadic. Areas near POEs and BPSs may have more concentrated noise associated with these activities.
Added and expanded POEs and checkpoints	This action may require construction, which would end at the completion of the project.
Operation of expanded BPS	Additional personnel would be required for addition or expansion of newly constructed facilities. The possibility of canine facilities, firing ranges, and patrol vehicles may be required for operations at some new/expanded facilities.
Aircraft operations	Air operations at CBP are diverse: Helicopters, fixed-wing aircraft, and unmanned aerial systems (UAS) may be used regularly at some locations, although not all aircraft are used simultaneously. Along with regular operations, training exercises are also a source of aircraft noise at some facilities.
Construction activities	CBP conducts both large and small construction projects. Each has some level of heavy equipment and truck transport noise.
Maintenance activities	Maintenance operations at CBP are as diverse as the facilities themselves. The noise associated with these actions can involve training to maintain each category listed above. These noise sources may be one major repair using heavy equipment, monthly routine maintenance, or daily maintenance in the case of dogs, horses, and vehicles.

2 Source: USDHS, 2010.

3 5.6.2.3 Non-CBP Noise Sources

4 The sources of noise along the border in the East of the Rockies (EOR) Region vary
5 greatly, although most of the region is rural or remote. Sounds dominating the rural areas
6 are aircraft overflights, bird and animal vocalizations, and very light traffic. Farming is a
7 major activity in some of the rural areas identified with the project area. Farming is
8 seasonal in this region and may create major sources of noise during planting, and even
9 more during harvest in August through October, when several large combines may
10 operate concurrently. A complete list of counties with their population and current

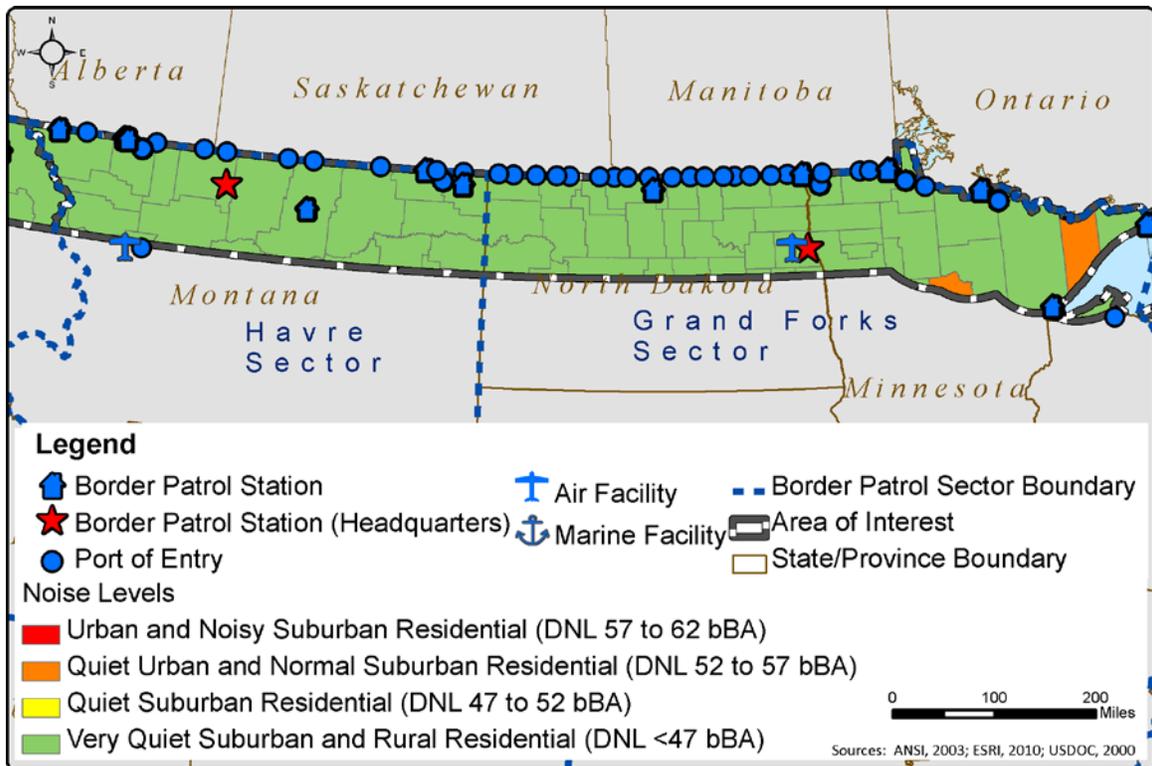
1 background noise levels can be found in Appendix O. Notably, these levels are estimated
2 average background levels based on population. Actual site-specific levels may vary
3 base on location.

4 5.6.2.4 Background Noise Levels

5 Estimated background noise levels for areas within 100 miles of the border are shown in
6 Figure 5.6-1 and described in Table 5.6-3. The majority of areas within 100 miles of the
7 border would be classified as remote or rural residential and are isolated, far from
8 significant sources of sound.

9 Townships and small cities are scattered throughout the 100-mile buffer area; however,
10 more remote land areas cover most of the project area. These smaller cities can be
11 described as rural-residential and quiet-commercial.

12 **Figure 5.6-1. Background Noise Levels in the East of the Rockies Region**



13

1

Table 5.6-3. Description of Background Noise Levels

Intensity Level	Example Land Use Category	Average Residential Intensity (people per acre)	Leq (dBA)		
			DNL	Daytime	Nighttime
Low	Quiet suburban residential	2	49	48	42
Medium-low		4	52	53	47
Existing		4.5	52	53	47
Medium	Quiet urban residential	9	55	56	50
Medium-high	Quiet commercial, industrial, and normal urban residential	16	58	58	52
High		20	59	60	54

2

Source: ANSI, 2003.

3

5.6.2.5 National Parks

4 The National Park Service (NPS) recognizes the natural soundscape of each national park
5 unit as an inherent resource, and manages this resource in order to “restore degraded
6 soundscapes to the natural conditions wherever possible, and protect natural soundscapes
7 from degradation due to noise” (USDOJ, 2000). Non-impairment of natural soundscapes
8 is mandated by the Organic Act of 1916 and is part of the NPS management goals and
9 objectives. Each region of the project area has locations of special interest such as
10 national parks. The national parks within 100 miles of the border in the East of the
11 Rockies Region are listed in Table 5.6-4.

12

Table 5.6-4. National Parks in the East of the Rockies Region

State	National Park	Acres
Minnesota	Voyageurs National Park	747,840
Montana	Glacier National Park	1,012,599
North Dakota	Theodore Roosevelt National Park	69,657

13

Source: USEPA, 2010.

14

1 **5.7 CLIMATE CHANGE AND SUSTAINABILITY**

2 **5.7.1 INTRODUCTION**

3 According to the 2009 U.S. Global Change Research Program (USGCRP) report, “Global
4 Climate Change Impacts in the United States,” documented impacts to the Nation from climate
5 change include increased average temperatures, more frequent heat waves, high-intensity
6 precipitation events, sea-level rise, more prolonged droughts, and more acidic ocean waters,
7 among others. Global and national temperature changes are not distributed evenly. Greater
8 increases occur at high, northern latitudes (CEQ, 2011). In 2010, the Department of Homeland
9 Security (DHS) identified global climate change as a long-term trend and global challenge that
10 threatens America’s national-security interests (USDHS, 2010).

11 Sustainability and smart growth are approaches to human activity that aim to meet the needs of
12 the present without compromising the ability of future generations to meet their own needs. For
13 U.S. Customs and Border Protection (CBP), the concepts of sustainability and smart growth
14 include the ability to adjust to changing geopolitical realities while preserving the environment
15 and working to improve the quality of life for American residents and visitors.

16 To reduce environmental impacts and address the challenge of limited resources, the DHS
17 prepared a “Strategic Sustainability Performance Plan” to promote sustainable planning, design,
18 development, and operations. The guidelines aim to decrease energy use, minimize reliance on
19 traditional fossil fuels, protect and conserve water, and reduce the environmental impact of
20 materials use and disposal. CBP’s overarching goal is to size, plan, and carry out proposed
21 development in a manner that is sustainable and that works to preserve and protect limited
22 resources.

23 **5.7.2 AFFECTED ENVIRONMENT**

24 **5.7.2.1 Climate Regions of the Northern Border—Overview**

25 The climate along the Northern Border is characterized by mild summers and very cold to
26 extremely cold winters. January is the coldest month. July is the warmest month throughout the
27 entire project area, and its temperature can fluctuate 20-30 degrees Fahrenheit between day and
28 evening (Idcide, 2010). Precipitation is evenly distributed throughout the year. The average
29 annual precipitation across the entire Canadian border is approximately 31 inches. There are two
30 recognized climatic zones within the East of the Rockies Region: Midlatitude Steppe Climate
31 and Highland (Alpine) Climate. A discussion of these zones is provided in the following
32 subsection.

33 **5.7.2.2 Climate in the East of the Rockies Region**

34 **Midlatitude Steppe Climate**

35 The Midlatitude Steppe Climate is found within temperate regions of the midlatitudes in the
36 interior regions of continents and where air masses are forced to lift up over higher elevations.
37 In the United States, these climates are found in the Great Plains and western states in the rain
38 shadow of major interior mountain ranges at great distances from sources of moisture.

1 Temperatures in these regions vary with latitude, elevation, and position within the continent.
2 Thus, the northern Great Plains experiences some of the lowest temperatures in this region.
3 Average temperatures increase at the southern limits of this climate region.

4 The region is classified as semi-arid. Peak precipitation occurs during the summer months
5 (Ritter, 2006).

6 **Highland (Alpine) Climate**

7 The highland climate is found in mountainous regions of the western United States that are
8 above timberline. It is one of the coldest climates in the United States due to high altitude. It is
9 similar to tundra and Arctic climate zones in that it is cold and dry throughout the year. Growing
10 seasons are short—about 180 days—and night temperatures are almost always below freezing.
11 Thinner atmospheres can allow often dangerous exposure to ultraviolet radiation.

12 **5.7.2.3 Climate Change in the United States—Northern Great Plains Regional Assessment**

13 In the Northern and Central Great Plains, average temperatures have risen 2 degrees Fahrenheit
14 (1 degree Celsius) in the past century, with increases of up to 5.5 degrees Fahrenheit (3 degrees
15 Celsius) in parts of Montana, North Dakota, and South Dakota. During the same period, annual
16 precipitation has decreased 10 percent in eastern Montana, North Dakota, eastern Wyoming, and
17 Colorado.

18 Climate models project continued regional increases in temperature, with the largest increases in
19 the western part of the Great Plains. More warming is expected in winter and spring than in
20 summer and fall. The models project precipitation increases in the Northern Great Plains Region
21 and decreases in the lee areas of the Rocky Mountains. However, overall, rising air temperatures
22 will increase evaporation rates, leading to a net soil-moisture decline for large parts of the region
23 (USGCRP, 2010).

24